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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

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Public Health Reports

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PROGRESS REPORT OF PUBLIC HEALTH NURSING CURRICULUM COMMITTEE [1]

Need for study.—The need for a curriculum guide for public health nursing has long been manifest. Since 1910, when the first university public health nursing program of study was organized, 26 universities or colleges have established programs of study approved by the National Organization for Public Health Nursing. During that time the only guide to curriculum content has been the standards of the National Organization for Public Health Nursing which appear as "Minimum Requirements for Approved Post-Graduate Courses in Public Health Nursing." These standards have undergone no radical revision. However, it is recognized that during the same period of time profound changes have taken place in the factors that affect content and method, including the science of medicine and public health, psychology, social science, and public health and public health nursing administration. While it is true that these changes have been reflected somewhat in public health nursing curricula, it is open to question whether the changes have been sufficiently far-reaching in the preparation of the public health nurse to meet present-day needs and future opportunities.

In view of the foregoing, it was deemed wise by the education committee of the National Organization for Public Health Nursing and by the Collegiate Council on Public Health Nursing Education to reevaluate and to redefine the standards and objectives of public health nursing and of public health nursing education. In order to accomplish this task, the National Organization for Public Health Nursing requested the United States Public Health Service to participate in a joint undertaking. This request was granted and, in February 1940, Mary J. Dunn, Public Health Nursing Consultant, United States Public Health Service, was assigned to the study.

Appointment of committees.—A central committee and an advisory committee were then appointed by the National Organization for

[1] In response to many requests this report is submitted as a summary of the status of the work of the committee to date, briefly reviewing the beginning steps and indicating most recent developments. Prepared by Catharine Tucker, Chairman, and Professor of Nursing Education, University of Pennsylvania, Philadelphia; and Mary J. Dunn, Public Health Nursing Consultant, U. S. Public Health Service, and Secretary to Public Health Nursing Curriculum Committee.

Public Health Nursing and the United States Public Health Service, with Miss Katharine Tucker as chairman of both committees. The functions of these committees are as follows: The central committee to define the scope and objectives and to give general direction to the study; the advisory committee to advise the central committee and to interpret the objectives and progress of the study to interested individuals and groups. The membership of these committees will be found listed at the end of this report.

Objective of project.—The objective and scope of this joint project, as set forth by the central committee, have been stated as follows: To determine what the public health nurse practitioner needs to know and the best way of providing the knowledge, skills, and attitudes required for optimal public health nursing performance.

While it is recognized that the public health nursing program is part of a degree program, the committee is limiting its consideration to the professional content only, this professional content to be based on the assumption of adequate undergraduate preparation. (Curriculum guide for schools of nursing.)

As an outcome of this undertaking the committee hopes to realize a curriculum guide for public health nursing, one that will be flexible rather than "hard and fast," and that will meet the needs of the present and possibly of the next 4 to 5 years. Such a guide should indicate the knowledge, attitudes, skills, and understanding to be realized in order (1) to enable the public health nurse to carry out her functions, and (2) to develop an individual who is able to adjust to changing situations.

Steps in procedure.—The steps in procedure will be reviewed briefly.

1. In order to have some concrete starting point the first step was general agreement regarding the "functional areas" to be considered in the field of public health, with the result that the following tentative list of 16 areas was evolved:

Maternal health.
Infant health.
Preschool child health.
Health of school child.
Communicable disease control.
Tuberculosis control.
Control of venereal diseases.
Pneumonia, influenza, and the common cold.
Orthopedic and plastic conditions.
Cancer control.
Heart conditions.
Mental disorders and diseases.
Diabetes control.
Oral conditions.
Industrial hygiene.

The order of listing these areas has no special significance, and, as yet, no attempt has been made to consider these functional areas in the order of their importance.

It is recognized that additional areas, e. g., housing, geriatrics, etc., may need to receive particular consideration; likewise, certain desig-

nated areas may need to be considered in combination with other areas.

Furthermore, while it may appear that the functional areas selected are limited merely to age groups and to particular conditions or diseases, such aspects as the positive elements of health, the psychological and sociological aspects, will not be lost sight of, but should permeate each functional area.

It should be emphasized that this device was used for practical purposes, and when the material is reassembled and organized for publication it will undoubtedly appear in an entirely different form. For example, in the final revision the titles of the 16 tentatively selected areas may not all appear as separate categories, and such titles as community relations, principles of teaching, and principles of public health nursing may be added.

2. The second step was the formulation of public health objectives pertaining to the foregoing 16 functional areas. Since it was proposed by the Public Health Service that this project be considered as a pivotal study for all public health personnel, as well as for public health nurses, and in order to view public health nursing as an integral part of the whole field of public health, objectives were formulated sufficiently broad to embrace the entire public health program within the designated functional areas. Invaluable assistance was given by many public health administrators in the drafting of these public health objectives, prior to their endorsement by the Central Curriculum Committee.

3. The third step was the redefining of our public health nursing functions, based on the previously formulated public health objectives. The procedure followed in this revision was comparable to that mentioned with regard to the public health objectives, namely, consultation with many public health and public health nursing leaders, followed by endorsement of the Central Curriculum Committee.

4. The fourth step was the appointment of 15 production committees, whose responsibility is the production or preparation of a "course of instruction" in a designated functional area, e. g., industrial hygiene, cancer control. It was proposed by the Central Curriculum Committee that the material prepared by the production committees include: (1) The knowledge and skills essential to public health nursing performance in a given situation; and (2) the suggestive activities that might aid in the acquisition of the essential skills indicated.

It is recalled that while 16 functional areas were listed tentatively, only 15 production committees were appointed. This is due to the fact that material on the control of venereal diseases was prepared as a pattern or guide by Miss Dunn, who used various advisers in the place of a separate production committee for this particular area.

Membership of production committees.—The production committees are composed of public health nurses, centering geographically about the 26 universities or colleges offering approved public health nursing programs of study. Representation on these committees includes the respective public health nursing programs of study, and also members of urban, rural, official, and nonofficial public health agencies located within a reasonable radius of the university or college so as to facilitate working arrangements and travel.

Thus it is obvious that the public health nursing membership of these committees consists (1) of those who are primarily engaged in the preparation of public health nurses, and (2) of those who are utilizing the products of our public health nursing programs of study.

Although actual membership of these committees is limited to public health nurses, the committees are urged to consult with advisers in allied or special fields.

The production committee chairmen are as follows:

Production committee:	*Chairman*
Maternal Health	Hattie Hemschemeyer, Maternity Center Association, New York, N. Y.
Infant Health	Marcella Fay, Instructive Visiting Nurse Society, Washington, D. C.
Preschool Child Health	Eula Butzerin, Division of Biological Sciences, Nursing Education, University of Chicago, Chicago, Ill.
Health of the School Child	Ella McNeil, Division of Hygiene and Public Health, University of Michigan, Ann Arbor, Mich.
Communicable Disease Control.	Rena Haig, California State Health Department, San Francisco, Calif.
Tuberculosis Control	Mellie Palmer, Department of Preventive Medicine and Public Health, University of Minnesota, Minneapolis, Minn.
Pneumonia, Influenza, and the Common Cold.	Ellen Buell, Department Public Health Nursing, University of Syracuse, Syracuse, N. Y.
Orthopedic and Plastic Conditions.	Helen Lehman, School of Nursing, Western Reserve University, Cleveland, Ohio.
Cancer Control	Kathleen Leahy, School of Nursing Education, University of Washington, Seattle, Wash.
Heart Conditions	A. Louise Kinney, Division of Public Health Nursing, St. Louis University, St. Louis, Mo.
Mental Disorders and Diseases.	Ruth Gilbert, Psychiatric Social Service, New Haven Dispensary, New Haven, Conn.
Diabetes Control	Dorothy Carter, Boston Community Health Association, Boston, Mass.
Oral Conditions	Lucille Perozzi, Oregon State Health Department, Portland, Oreg.
Nutritional Conditions	Thelma Anderson, Tennessee State Health Department, Nashville, Tenn.
Industrial Health	Caroline di Donato, College of Nursing, Marquette University, Milwaukee, Wis.

Since the production committees are scattered throughout the country, it appeared essential to plan for a conference of the committee chairmen in order to arrive at some common understanding of the purpose and scope of the project, the responsibility of each committee, and the procedure to be followed in order to realize a reasonable de ree of similarity in the results. Consequently, a 2-day conference was held in Philadelphia, January 24–25, 1941, with Dr. Arthur Jones as curriculum construction consultant.

Dr. Jones presented certain philosophic principles basic to general education, and then applied them to the special needs of the public health nurse. He emphasized particularly the importance of the learning process and the role of the teacher in helping others to learn. His very practical suggestions regarding unit construction, together with the sample unit on venereal diseases, were accepted by the group as a guide or pattern to follow in the development of the assigned courses of instruction.

It was agreed by the various production committee chairmen that the assignment be completed and submitted to Miss Dunn by April 1.

The interest manifested by the conference members, the free and stimulating discussion, and the willingness of all to assume the important responsibility placed upon them should result in a public health nursing curriculum guide which will give a new, vital, and dynamic approach to learning, one that will not be stereotyped but will be capable of adaptation and of indicating direction.

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HYDROGEN SULFIDE: ITS TOXICITY AND POTENTIAL DANGERS

Prepared by the DIVISION OF INDUSTRIAL HYGIENE, *National Institute of Health, United States Public Health Service*

Hydrogen sulfide is an irritant and toxic gas. It causes irritation of the entire respiratory system and of the conjunctiva of the eye, and in high concentrations it may produce respiratory paralysis and neurological changes.

Physico-Chemical Properties of Hydrogen Sulfide.

Hydrogen sulfide, H_2S, is a colorless gas having an offensive odor, as of rotten eggs, at low concentrations and a sweetish odor at high concentrations. Even high concentrations may not be detected by the odor on account of their rapidly paralyzant effect on the olfactory nerve. It is combustible in concentrations of between 4.4 and 44.5 percent in air, has a molecular weight of 34.08, a specific gravity of 1.192 (air=1), a boiling point of −59.6° C. and a melting point of −82.9° C. It is soluble in 100 parts of water to the extent of 437 cc. at 0° C. and 186 cc. at 40° C.; in 100 parts of alcohol, 9.54 cc. are dissolved at 15° C.; and it is soluble in hydrocarbons such as gasoline, kerosene, and crude oil.

Maximal Permissible Concentration of Hydrogen Sulfide.

The maximal permissible concentration of hydrogen sulfide in air is accepted at present as 20 parts per million by volume, corresponding to 0.028 milligrams per liter of air at 25° C. and 760 mm. Hg for exposures not exceeding a total of 8 hours daily.[2]

[1] Central Committee.

[2] This figure for the maximal permissible concentration of hydrogen sulfide has been accepted and published by the American Standards Association in its Standard on Allowable Concentrations of Toxic Dusts and Gases—Z37.2-1941. This standard may be purchased from the American Standards Association, 29 West Thirty-ninth Street, New York, N. Y.

Sources of Exposure to Hydrogen Sulfide.

Hydrogen sulfide occurs naturally in the gases of volcanos and in the waters of certain spas, in mines, as for instance from the decomposition of pyrites, and in certain sulfur-carrying brands of coal oil. In the latter, hazards from hydrogen sulfide appear to exist mainly in "lime wells", whereas "granite-wash wells" contain only concentrations of up to 0.01 percent hydrogen sulfide (*1, 2*). It should be pointed out that both water and petroleum products can carry dangerous concentrations of hydrogen sulfide in solution, which may be given off later.

It occurs wherever *protein-containing materials* are putrefying, as for instance in tanneries (*3, 4*); in the manufacture of glue; in washings from sugar beets; and in sewer gases.

In the *chemical industry* hydrogen sulfide may be formed in a variety of processes, as for instance in the manufacture of carbon disulfide, of sulfur dyes, and of soda according to the LeBlanc process.

Exposure to hydrogen sulfide may also exist in the *rubber industry* and in the *rayon industry* where the viscose process is used.

Determination of Hydrogen Sulfide in Air.

For the determination of hydrogen sulfide in air, samples should be taken wherever there is a known or suspected source of hydrogen sulfide. Such samples should be taken at the breathing zones of the workers exposed, special emphasis being given to the locations nearest the source and those in the path of air currents carrying the gas. They should be taken at sufficient intervals of time so that any variations in concentrations will become evident and in sufficient number to avoid any reasonable doubt of the results found.

To rely on the detection of hydrogen sulfide by its odor is extremely treacherous because the olfactory nerve endings are readily paralyzed by the gas.

It can be qualitatively detected by the darkening of moist lead acetate paper in an atmosphere containing hydrogen sulfide (*5, 6*) and the following tabulation may give an indication of the relation between this reaction and the odor of such mixtures (*6*).

Concentration		Odor	Reaction with lead acetate paper
Parts per million	Mg. per liter		
340	0.47	Marked	Immediately.
34	.047	do	Do.
3.4	.005	Distinct	After 2 seconds.
0.34	.0005	Noticeable	After 30 seconds.

Hydrogen sulfide may be determined quantitatively by passing the contaminated air through a titrated iodine solution which, however,

gives reliable results only in the absence of light. The reaction takes place according to the equation $H_2S+I_2=2HI+S$.

Hydrogen sulfide may also be determined (*7*) by passing the contaminated air through bromine water and subsequent gravimetric determination of the sulfate formed as barium sulfate.

Concentrations of Hydrogen Sulfide in Air.

Concentrations encountered in different industries may show considerable variation (*8*).

Absorption and Elimination of Hydrogen Sulfide.

Hydrogen sulfide is mainly absorbed through the lungs; the absorption from the gastro-intestinal tract is of no importance in regard to its hazards in industry.

The possibility of its absorption through the skin has aroused much controversy since cases of hydrogen sulfide poisoning from the use of sulfur ointments have been reported repeatedly. From animal experiments (*9*) it appears not certain that this is the case, but even if it takes place (*10*) the absorption is too slow to cause systemic effects.

Hydrogen sulfide is eliminated mainly through the lungs. A small fraction is excreted with the urine, as sulfide.

Determination of Hydrogen Sulfide in Urine.

Since hydrogen sulfide may be formed by putrefaction in urine, only freshly voided samples can be expected to give results of significance for exposure to hydrogen sulfide. A current of air is first passed through a solution of potassium hydroxide and then through the urine and hence into a narrow glass tube containing a strip of moistened lead acetate paper. The hydrogen sulfide may also be determined colorimetrically by the Caro-Fischer method (*11*).

Relation Between Concentrations of Hydrogen Sulfide in Air and Toxic Symptoms.

Table 1 illustrates the physiological effects of hydrogen sulfide in man with certain concentrations determined by the iodine method (*12, 13*).

In viscose plants it was found that 16 parts per million cause no irritation, whereas, with concentrations varying from 18 to 28 parts per million, 25 out of 78 persons complained of irritation of the eyes (*14*). It has been stated that exposure to 5,000 parts per million may be immediately fatal; with exposure for one-half to 1 hour to 500 to 700 parts per million life may be endangered; and no systemic effects should be expected even with continued exposure to such low concentrations as 30 to 50 parts per million. On the other hand, it appears that the local effects, especially irritation of the eyes, may occur occasionally even with concentrations as low as 15 parts per million (*14*).

TABLE 1.—*Relation between toxic action of hydrogen sulfide and its concentration in air*

[K. B. Lehmann (*12*)]

Concentration		Duration of exposure	Symptoms	Aftereffects
Parts per million	Mg. per liter			
20– 40	0.027–0.054	----------	No irritation.	
70– 90	0.097–0.125	----------	Slight irritation.	
100–140	0.139–0.194	3 hrs----------	Irritation, salivation, nasal secretion after 1 hr. 20 min., cough after 1 hr. 51 min., after 1 hr. 55 min. irritation less, after 3 hrs. all complaints disappear.	Irritation, conjunctivitis, fever, bronchitis, and diarrhea.
246–410	0.342–0.570	1 hr. 45 min----	Irritation, later impaired respiration, later decreased irritation, conjunctivitis.	Marked irritation, fatigue, bronchial catarrh.
373–493	0.518–0.865	1 hr. 32 min----	Irritation and nasal secretions.	Later marked pain in eyes, cough, fatigue, loss of appetite, bladder spasms, diarrhea.
532	0.740	30 min----------	Marked irritation, nasal catarrh, impaired respiration, tachycardia, palpitation, cough, unsteady gait, tremors, fatigue, and headache.	Marked irritation, fatigue, and bronchial catarrh.

The Clinical Picture of Hydrogen Sulfide Poisoning.

The toxic effects produced by hydrogen sulfide vary considerably with the concentration to which a person may be exposed.

With high concentrations, the victim may suddenly collapse and die from respiratory paralysis. In case the exposure is not quite so severe, there may be a progressive depression of the respiration and death may result from paralysis of the respiratory center. With less serious exposure the irritant action of hydrogen sulfide may be predominant, resulting in irritation of the mucous membranes of the eye and of the respiratory tract, causing, possibly, pulmonary edema or bronchial pneumonia.

Whereas with massive exposure the depressant effect on the central nervous system predominates, continued exposure to lower concentrations may cause fatigue, headache, especially in the temples, and such nervous conditions as irritability and sleeplessness.

The irritant action of hydrogen sulfide on the mucous membranes of the respiratory tract may lead to rhinitis, bronchitis, and pneumonia (*15*).

This irritant effect is, however, most conspicuous on the membranes of the eye and it may result in very painful conjunctivitis with marked injection, lacrimation, photophobia, and occasionally in defects of the cornea. It appears that under certain conditions such defects may be the first and main symptom, leading to foggy vision and other disturbances such as colored rings around the lights, which may be due to interference phenomena. The defects represent punctated erosions of the cornea (*16*) which in severe cases may flow together

and in which the epithelial layers are loosened; this condition may be preceded by a period of scaling (*17*).

Regarding the effects of hydrogen sulfide on the *gastro-intestinal tract*, loss of appetite, loss of weight, nausea and vomiting (*18*) have been associated with exposure to hydrogen sulfide; animal experiments (*19*), however, appear to indicate that there is no direct toxic effect of hydrogen sulfide on the digestive organs.

Direct contact with hydrogen sulfide may cause hyperemia and erythema of the skin (*10*). The statements that even low concentrations interfere with the healing of small wounds (*20*) and that the continued exposure to aqueous solutions, as for instance in certain mines and spas, may lead to the formation of blisters and ulcers appear to need further study.

Late effects of hydrogen sulfide poisoning may result in inflammatory processes of the respiratory tract (*15*) or in circulatory disturbances characterized by bradycardia and temporary weakening of the cardiac muscle (*21*); peripheral neuritis, lymphocytosis, and gastro-intestinal disturbances have also been reported as sequelae of hydrogen sulfide exposure (*22*, *23*).

Regarding the possibility of habituation to exposure to hydrogen sulfide, it appears that this does not exist; on the contrary, animal experiments (*13*) and experience in humans indicate that hypersusceptibility may result from the toxic effects of hydrogen sulfide.

The question has been raised repeatedly as to whether or not hydrogen sulfide and carbon disulfide have a synergistic action, but experiments (*24*) appear to indicate that the two compounds have only an additive effect.

The Pathological Changes in Hydrogen Sulfide Poisoning.

Regarding pathological changes resulting from exposure to hydrogen sulfide, information is very limited. In animal experiments the picture varies considerably with the intensity of the exposure (*25*). Whereas in acute poisoning the organs, especially the lungs, are practically of normal appearance or are collapsed, of pink to white color and of leatherlike consistency (*26*), in subacute poisoning there is always a more or less marked hyperemia and congestion. The blood vessels of the lungs are engorged, the alveoli sometimes destroyed or filled with transudate and blood, and with repeated exposure the former may also contain leucocytes. This transudation may result in pulmonary edema and, in addition, liver, kidneys, and spleen may contain considerable pigment deposits (hemosiderin) which in the case of the liver are mainly located in the Kupffer's cells (*9*) which may also show signs of degeneration and necrosis.

Mechanism of the Action of Hydrogen Sulfide.

The mechanism of the toxic action of hydrogen sulfide is in part still controversial. Early investigators assumed that it affected the hemoglobin by the formation of sulfhemoglobin, but, although this reaction may take place *in vitro*, it has not been observed *in vivo* (*27*) or has been seen only experimentally with extremely high concentrations. Hydrogen sulfide reacts readily, however, with methemoglobin, forming sulfhemoglobin, and this may explain its presence in the blood of cadavers.

Others have assumed that hydrogen sulfide is, primarily, a nerve poison.

More recently it has been claimed that hydrogen sulfide interferes mainly with the oxygen metabolism of the cell by affecting the iron-containing ferment and that the primary stimulation of the respiration is not due to irritation but is a sign of beginning anoxia. This assumption was partly based on the observation that in animal experiments exposure to hydrogen sulfide increased the oxygen capacity of the venous blood considerably, which was interpreted as a result of an inability of the tissue to assimilate the oxygen of the arterial blood to the same extent as normally (*28*), and that the administration of iron may alleviate this effect (*29*, *30*). Other investigators (*31*) confirmed this phenomenon but found that this change later on moves in the opposite direction, which could not be explained on the basis of respiratory paralysis, and that it appears more likely that such changes of the composition of the blood gases are due to changes of the respiratory type, that is, primary hyper- and subsequent hypo-ventilation corresponding to the irritant effect on the mucous membranes and the depression of the central nervous system.

Regarding the fate of hydrogen sulfide in the organism, some investigators assume that it combines with the alkali of the blood and circulates as sodium sulfide, and it has been suggested (*32*) that this reduction of the alkali reserve may play a part in acute hydrogen sulfide poisoning. According to others (*33*) hydrogen sulfide is detoxified in the blood by oxidation and for this reason administration of oxygen, if necessary combined with artificial respiration, may prove beneficial.

Prophylactic Measures.

In order to prevent hydrogen sulfide poisoning, it is of great importance that all those handling this material or who may be exposed to it be informed regarding its toxicity and potential dangers, and also of the fact that in its detection one cannot rely upon the characteristic odor because, as pointed out above, the olfactory nerve is paralyzed very readily by hydrogen sulfide.

In evaluating the potential dangers of hydrogen sulfide, it appears important to realize that the toxicity may increase with the humidity

of the air because the moisture in the air may become saturated with hydrogen sulfide and this acid mist may be a contributing factor (*34*). In addition, other factors which tend to increase the respiration, such as an increase in the carbon dioxide and a decrease in the oxygen content of the air, and physical exercise, may be aggravating factors in the onset of hydrogen sulfide poisoning.

It is, therefore, essential that, in all operations where hydrogen sulfide may contaminate the air, the concentration of 20 parts per million be maintained by proper exhaust ventilation, preferably at the site of the formation of the gas. In order to destroy hydrogen sulfide in waste water, as for instance in the washing of beets, chlorination of such waste water with sodium hypochlorite (*35*) may prove helpful.

Whenever rooms or enclosures (sewers, beet bins, etc.) have to be entered which may contain hydrogen sulfide, this should be done only with open-air masks, safety belts, and under the supervision of a crew familiar with the potential dangers of such exposure and with the proper first-aid measures.

Treatment of Hydrogen Sulfide Poisoning.

In poisoning from hydrogen sulfide, the patient should be transferred to fresh air as quickly as possible. He should be kept at rest, and should be placed under the care of a physician. Any chilling should be prevented. If the respiration is slow, labored, or impaired, artificial respiration may become necessary. This should, however, be performed with great caution on account of the possible hyperemia and congestion of the lungs. If necessary, artificial respiration may be combined with the inhalation of oxygen.

Conjunctivitis resulting from exposure to hydrogen sulfide may be treated by instillation of 1 drop of olive oil which is said to alleviate the pain. In severe cases, administration of 3 to 4 drops of 1 : 1,000 solution of epinephrine every 5 minutes may prove helpful. If the pain becomes very severe, local anesthetics and hot or cold compresses may be of benefit.

The irritation of the respiratory tract should be treated symptomatically and expectoration of mucus should be facilitated by the administration of expectorants.

REFERENCES

(Those publications preceded by an asterisk (*) are out of print. Those preceded by two asterisks (**) may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. It is believed that most of the other publications may be consulted in local medical or technical libraries, or access to them may be secured through State health departments.)

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TISSUE FACTORS IN ANTIRABIES IMMUNITY OF EXPERIMENTAL ANIMALS [1]

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The mechanism of immunity developing after antirabies vaccination, the site of that immunity, and the role of the circulating blood serum antibodies in protecting the immunized animal from rabies infection have not been determined definitely. Indeed, there is no incontrovertible evidence in the literature to show the exact pathway traveled by rabies virus, introduced peripherally, to its ultimate arrival in the central nervous system.

Goodpasture (*1*) showed in rabbits that the early appearance of localized paralysis and histological cellular changes were suggestive of spread centrally along the peripheral nerve when virus was injected into the masseter muscle, and Schaffer (*2*) reported similar findings when virus was given into the leg muscles. That virus injected into the gastrocnemius muscle of mice appears in the lumbar cord in 3 to 5 days, then passes rapidly to the brain where it multiplies quickly to give symptoms from the ninth to the fourteenth day, has been demonstrated by Webster (*3*, *4*), who also states that when subcutaneously introduced the virus appears in the area of the central nervous system supplying that particular skin region, although the virus cannot be demonstrated in the peripheral nerve until it is also present centrally. That the virus can spread centrally when introduced into a peripheral nerve and peripherally when injected intracerebrally has been demonstrated by Nicolau and his coworkers (*5*, *6*, *7*), who also proved the necessity of uninterrupted continuity of the peripheral nerve for accomplishing this spread.

Gantt and Ponomarew (*8*) succeeded in infecting dogs with fixed virus given intramuscularly only when a spinal tap was performed simultaneously. Intraneural injection produced infection only if the site of inoculation was incised. On the basis of these findings, the authors conclude that the central spread of rabies virus is along axis cylinders, with the normal flow of lymph in the nerves as a factor.

[1] From the Division of Biologics Control, National Institute of Health.

Manouelian (*9*) has found the sympathetic neurones to be quite susceptible to rabies virus and suggests that "endoneurocytes," which are neurones supplying sensory nerves, may carry the virus. Pigalev (*10*) suggests that peripheral nervous stimulation is a factor in determining the site of localization of virus in the central nervous system. Sabin, Casals-Ariet, and Webster (*11*) have traced the spread of virus, by histological and animal inoculation techniques, through the central nervous system after intranasal instillation. Virus was first demonstrated in the brain on the third to fourth day and then quickly spread through the central nervous system. It was occasionally demonstrated in the rhinencephalon before being present in the rest of the brain.

Levaditi and Schoen (*12*), in attempting to demonstrate local multiplication of virus, found that Negri bodies could not be demonstrated in the inoculated cornea of rabbits until they were also in the uninoculated eye and the animal showed symptoms.

Remlinger and Bailly (*13*) demonstrated virus at the site of intracerebral inoculation and in nuclei of the facial nerve on the ninth day, although the controls did not develop symptoms until the sixteenth day and the concentration of virus was greatest in the facial nuclei. Because of the early invasion of the nervous system these writers feel that the vaccine treatment must neutralize the virus after it has reached the nervous tissue.

Leach and Johnson (*14*) examined tissues from three human cases of rabies for the presence of virus. They were unable to demonstrate it in the spinal fluid, blood, kidney, liver, pancreas, spleen, or adrenal. Virus was present in the lacrimal and salivary glands. Investigation of the distribution of virus in the brain showed the highest titer to be in the anterior central gyrus, thalamus, pons, medulla, cervical thoracic and lumbar cords.

Of several attempts to infect animals by administering the virus intravenously some have been successful (*15*, *16*, *17*), others unsuccessful (*18*), but this does not appear to be a factor in the pathogenesis of the naturally occurring disease. Likewise, the isolation of virus from the blood of an infected animal at any time during the disease has been rather rare. Marie and Urbain (*19*) report several successful attempts. Schweinburg and Windholz (*20*) used parabiotic rats to disprove the presence of virus in the blood as a factor in the development of rabies.

Hurst (*21*), in summarizing the subject, states that most of the evidence points to a neural pathway of virus spread but that this is difficult to explain in view of the physical constitution of the nerve fibers and that the perineural lymphatics and the cerebrospinal fluid may play a secondary role.

As to which cell type produces antibodies and which tissues are responsible for destruction of virus introduced into an immunized animal, Tzeknovitzer and Goldenberg (*22*) found by immunizing rabbits subcutaneously, intramuscularly, subdurally, meningeally, and intracerebrally that it is possible for meningeal, ependymal and neuroglial cells to produce antibodies, but concluded that the most important factor in immunity is the ability of antibodies produced elsewhere to penetrate the blood-brain barrier.

Biglieri and Villegas (*23*) found that direct vaccination of nervous tissue gave but a slight prolongation of the incubation period on subsequent infection but that neutralization tests with tissues of an immunized animal showed the nervous tissue equal in virus neutralizing properties to liver and spleen but less than the adrenals. On the other hand, Pereira da Silva (*24*) could not demonstrate the virus neutralizing property of brain tissue of an immunized animal nor could Jonesco (*25*) of a naturally immune dog. The spleen has no important role in antirabies immunity as shown by Plantureaux (*26*), whose dogs, splenectomized before and after immunization, were still immune. In the experiments of Marie (*27*), fixed virus intraperitoneally did not produce rabies unless the reticulo-endothelial system was first blocked by India ink. Nicolau and his coworkers (*28*) discovered that there were definite histological changes in the central nervous system following rabies immunization of rabbits, most marked in the lumbar cord posterior ganglia and posterior horn cells with milder cellular reactions higher up in the cord and brain.

In studying the mechanism of the immunity produced by the Pasteur method, Cruveilhier, Nicolau, and Kopciowska (*29*) found no live virus in the nervous system of vaccinated animals although there were definite histological changes. Street virus injected into the sciatic nerve at the start of immunization caused rabies, but partial immunity was demonstrated when the inoculation was made on the fifth day of immunization.

That virus-neutralizing immune bodies appear in the blood serum of animals and humans following rabies vaccine has been demonstrated by many workers, but there does not appear to be any definite relationship between the titer of these neutralizing bodies and the degree of actual immunity to virus introduced through natural channels (*30*).

An attempt was made in the series of experiments here reported to determine the tissue site of antirabies immunity by observing any difference in the progression of peripherally introduced virus in normal and in immunized mice and guinea pigs, as well as by the titration of the virus-neutralizing properties of tissues of immunized rabbits. The experiments with mice have been carried out on two groups, one

immunized with a live virus vaccine and the other with phenolized virus vaccine.

PREPARATION OF VACCINES

Rabbit No. 1 received intracerebrally 0.2 cc. of a 1:10 emulsion supernatant of fixed rabies virus mouse passage brain and was completely paralyzed in 7 days. It was then killed with chloroform, the brain removed and divided longitudinally into two parts, each of which was weighed, then emulsified in a 20 percent emulsion after straining through gauze. To the 20 percent emulsion of half of the brain was added an equal amount of 2 percent phenol and the flask was placed in the incubator at 37° C. for 24 hours, after which both were diluted to a 5 percent emulsion.

IMMUNITY OF VACCINATED MICE TO FIXED RABIES VIRUS INTRACEREBRALLY

The degree of immunity to a post-vaccination test dose of fixed virus intracerebrally was tested for each of the vaccines. Twenty-five white mice weighing 20 to 25 gm. were given 0.25 cc. of a 1:20 dilution of each vaccine, intraperitoneally, every 2 days for 6 doses. Twenty-eight days from the beginning of the vaccination these mice were injected intracerebrally with serial dilutions of a heterologous strain of fixed virus in doses representing 1, 10, 25, 50, 100, and 200 M. L. D. The results as shown in table 1 indicate that the live fixed virus vaccine protected mice against 10 M. L. D. while the phenolized fixed virus vaccine protected against but 1 M. L. D.

TABLE 1.—*Immunity titer of 2 types of vaccine in mice*

Type of vaccine	Fixed virus dilution—test dose 0.03 cc. intracerebrally							Protected against
	1:50	1:100	1:200	1:400	1:1000	1:10,000	1:100,000	
Live fixed virus	[1] 14 14 [2] S	10 12 14 S	12 22 S S	4 13 18 S	21 S S S	S S S	.....	10 M.L.D.
Phenolized fixed virus	11 11 12	10 S S	12 14 S	13 14 S	13 14 S S	S S S	.....	1 M.L.D.
Controls	.....	11 11 18	.....	.....	13 14	15 19 21	14 S S	.....

[1] Day of death.
[2] Survived.

PROGRESSION AND *in vivo* NEUTRALIZATION OF RABIES STREET VIRUS IN THE TISSUES OF IMMUNIZED MICE

Twelve Swiss mice weighing 25 to 30 gm. were immunized with 0.25 cc. of a 1:10 dilution of each vaccine, intraperitoneally, every 2 days for 9 doses. Fifty days following the beginning of this immunization all mice in each group and an equal number of controls were given 0.02 cc. of a 1:5 dilution of first passage guinea pig street virus

brain into the gastrocnemius muscle of the right hind leg. Twenty-four hours after this intramuscular injection of street virus and again at 48 hours and at 10 days, mice from each group and from the controls were killed with chloroform and under aseptic conditions the gastrocnemius muscle of the right hind leg, the right sciatic nerve, the lumbar portion of the spinal cord, the brain, and the spleen were removed. Each tissue was finely divided, washed three times with sterile salt solution, then emulsified at approximately 1:5, centrifuged at 1,000 r. p. m. for 5 minutes, then 0.03 cc. of the supernatant was injected intracerebrally into 3 young Swiss mice weighing 10–15 gm. These mice were observed for 60 days and an attempt was made to check all deaths by examination of smears from Ammon's horns for Negri bodies. However, many of the mice died during the night and had been eaten by their cage mates before morning. In table 2 those mouse brains that were examined for Negri bodies are indicated as being either positive or negative. Taking 2 deaths after the tenth day out of the three mice injected with each tissue, whether examined for Negri bodies or not, or at least one death in which Negri bodies were found, as the criterion for the presence of virus, it was found that by 24 hours the street virus was not demonstrable in the muscle of the controls but was present in the sciatic nerve; after 48 hours the virus was still present in the sciatic nerve and had also reached the lumbar cord. Ten days following its introduction it was not recovered in any of the tissues examined.

TABLE 2.—*Presence of street virus in tissues of immunized mice 1, 2, and 10 days following peripheral injection of street virus*

Type of vaccine, mouse immunization	Time after street virus intramuscularly	Tissue emulsions injected intracerebrally in mice 0.03 cc. of 1:5 emulsion														
		Muscle			Sciatic nerve			Spinal cord			Brain			Spleen		
Live fixed virus vaccine	24 hours	[1] 16	[2] S	S	6	16	S	14	S	S	S	S	S	15	S	S
	48 hours	14	15	S	S	S	S	12	S	S	14	S	S	14	S	S
	10 days	S	S	S	7	7	7	7	S	S	6	6	[3] 0	4	12	S
Phenolized fixed virus vaccine	24 hours	26	S	S	S	S	S	S	S	S	15	S	0	13	58−	0
	48 hours	9−	9+	S	11	19	19	10	10	12	11+	12+	16	9	10	S
	10 days	6	S	S	7	20+	22+	4	6	16+	6	17+	S	S	S	S
Controls	24 hours	6	S	S	8	20+	0	0	S	S	0	S	S	0	S	S
	48 hours	13−	0	S	12+	15+	S	12+	S	S	S	S	S	S	S	S
	10 days	4	4	6	6	S	S	4	5	S	0	S	S	6	0	S

+ = Positive for Negri bodies.
− = Negative for Negri bodies.
[1] Number = Day of death.
[2] S = Survived.
[3] 0 = Traumatic death.

In the mice immunized with the phenolized virus vaccine the street virus was demonstrated only in the spleen at the end of 24 hours, in all the tissues except the spleen in 48 hours, and in the sciatic nerve,

spinal cord, and brain in 10 days. In the group immunized with live virus vaccine the street virus was present in none of the tissues after 24 hours, in 48 hours only in the muscle, and in 10 days in none.

As a secondary control several mice of each vaccinated group and of the controls were observed for a period of 60 days. None developed symptoms and all survived, including the control mice.

In vitro NEUTRALIZATION OF FIXED RABIES VIRUS BY TISSUES OF IMMUNIZED RABBITS

Rabbits weighing 1,500 to 2,000 gm. were immunized with a daily dose of 2 cc. of the undiluted vaccine, subcutaneously, in the abdomen for 15 doses. Fifty days later these rabbits and a control of equal weight were bled to death and under aseptic conditions a portion of the hamstring muscles, sciatic nerve, lumbar cord, and brain were removed and weighed, then divided into very small pieces and thoroughly washed with sterile salt solution three times. The washed tissue was then emulsified to make a 10 percent emulsion by weight except the sciatic nerve which was diluted to a 5 percent emulsion. Equal parts of these emulsions were mixed with 1:5, 1:50, and 1:500 dilutions of fixed virus, the titer of which was 10^{-4}, so that the resulting mixtures would contain 10, 100, and 1,000 M. L. D. of the test virus. The virus-tissue mixtures were incubated at 37° C. for 2 hours, then placed in the ice box overnight, and the following morning 0.03 cc. of each mixture was injected intracerebrally into 3 white mice (20 to 25 gm.). These mice were observed for 30 days; table 3 shows the time of deaths.

TABLE 3.—*In vitro neutralization of fixed virus by tissues of immunized rabbits*

Type of vaccine, rabbit immunization	Test dose, number M. L. D. of fixed virus	Tissue emulsion mixed with test dose 0.03 cc. intracerebrally in mice											
		Muscle			Sciatic nerve			Spinal cord			Brain		
Live fixed virus vaccine	10	[1]12	[2]S	S	S	S	S	S	S	S	10	13	S
	100	S	S	S	9	10	11	9	9	11	9	11	12
	1,000	10	10	11	9	9	9	8	8	9	9	9	11
Phenolized fixed virus vaccine	10	S	S	S	S	S	[3]0	8	10	S	S	S	S
	100	S	S	S	11	14	S	8	11	0	8	9	10
	1,000	9	9	10	8	8	9	9	10	11	7	8	10
Controls	10	S	S	S	9	12	S	10	10	S	9	10	15
	100	10	S	S	7	10	11	8	11	12	10	10	10
	1,000	7	8	11	8	9	12	8	8	10	10	10	12

[1] Number = Day of death.
[2] S = Survived.
[3] 0 = Traumatic death.

The tissue of the control rabbit showed no neutralization of virus except with the muscle tissue which neutralized 10 and 100 M. L. D.

The rabbit immunized with phenolized fixed virus vaccine gave the same neutralization with the muscle as did the control but also had

protection against 10 M. L. D. in the brain and 20 M. L. D. in the sciatic nerve.

Live fixed virus vaccine gave virus neutralization of 10 M. L. D. in the spinal cord, 20 M. L. D. in the sciatic nerve, but none in the brain and the same as the control in the muscle.

VIRUS-NEUTRALIZING PROPERTIES OF SERA OF IMMUNIZED RABBITS

Blood removed at the time the immunized rabbits were killed on the fiftieth day after vaccination was used to determine the titer of virus neutralizing antibodies in the serum. Equal parts of serum and dilutions of the same fixed virus used as test dose throughout this study were mixed and incubated at 37° C. for 2 hours, then 0.03 cc. injected into 3 white mice (20 to 25 gm.). The virus-serum mixture for each serum represented 1, 10, 25, 50, and 100 M. L. D. of virus. Results tabulated in table 4 show that the phenolized virus vaccine serum neutralized but 50 M. L. D. of virus, whereas the live virus vaccine neutralized at least 100 M. L. D.

TABLE 4.—*Serum neutralization titer of immunized rabbits*

Type of vaccine, rabbit immunization	Fixed virus dilution mixed with serum 0.03 cc. intracerebrally in mice																	Serum protected against
	1:5			1:10			1:20			1:50			1:500			1:5000		
Live fixed virus vaccine	[1] S	S	S	S	S	S	S	S	S	S	S	S	S	S	S			100 M.L.D.
Phenolized fixed virus vaccine.	[2] 10	14	S	S	S	S	13	S	S	S	S	S	S	S	S	----------		50 M.L.D.
Control	----------			11	11	9	10	10	12	10	12	12	11	12	13	14	S	S	----------

[1] S=Survived.
[2] Number=Day of death.

PROGRESSION AND *in vivo* NEUTRALIZATION OF STREET VIRUS IN GUINEA PIGS RECEIVING POST-INFECTION IMMUNIZATION

Ten guinea pigs weighing 250 to 300 gm. were given 0.25 cc. of a 1:10 emulsion supernatant of first guinea pig passage street virus brain into the left gastrocnemius muscle. Five of these guinea pigs were started on a daily dose of 2 cc. of a 15 percent phenolized rabies vaccine given subcutaneously into the abdomen. This vaccine had previously been shown to be highly immunizing by the mouse test.

One guinea pig from the vaccinated and one from the unvaccinated group were killed by exsanguination on the first, second, fourth, seventh, and fourteenth days following the intramuscular injection of street virus.

The muscle at the site of inoculation, sciatic nerve on the left, spinal cord, and brain were removed, washed with salt solution, and emulsified at 1:10 with alundum in 10 percent solution of horse serum in distilled water. These emulsions were centrifuged and 0.03 cc. of

the supernatant injected intracerebrally into three 1-month old Swiss mice. Three mice were also given, intracerebrally, 0.03 cc. of the blood serum taken at the time of killing the animal. The mice were observed for a period of 2 months and all deaths were checked for the presence of Negri bodies in smears made from Ammon's horn. As a further control, a group of three guinea pigs received the same dose of street virus in the gastrocnemius muscle and were observed for 2 months. Two of the three died and were Negri-positive. As a control on the immunizing power of the vaccine we have the results of another experiment in guinea pigs run at the same time as the experiment being reported here. Ten guinea pigs received the same street virus emulsion as the above test animals—0.25 cc. into the right masseter muscle. Five animals then received 12 daily doses of 2 cc. of the vaccine used in the above experiment, subcutaneously in the abdomen, and all animals were observed for 2 months and checked for Negri bodies at death. Eighty percent of the unvaccinated and 40 percent of the vaccinated animals died of rabies, showing the efficacy of the vaccine.

The results of the mouse inoculations with guinea pig tissues are shown in table 5. Control animals showed the presence of street virus in the blood, muscle, and sciatic nerve 2 days after the inoculation, in the muscle on the fourth day, and in the spinal cord and brain on the fourteenth day.

TABLE 5.—*Presence of street virus in tissues of guinea pigs*

Group	Days after street virus intramuscularly	Guinea pig number	Tissue emulsion injected intracerebrally in mice														
			Blood serum			Muscle			Sciatic nerve			Spinal cord			Brain		
Vaccinated	1	295	[1]0	0	0	[2]S	S	0	S	S	S	S	S	S	S	S	[3]14−
	2	296	S	S	S	S	S	35−	S	S	S	S	S	S	S	S	S
	4	297	6−	33−	0	S	0	24+	S	20−	0	S	S	S	S	S	18−
	7	298	S	S	S	S	S	0	S	S	S	S	S	S	S	S	S
	14	299	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Controls	1	292	0	0	0	0	0	0	S	S	S	S	S	S	S	S	S
	2	291	S	S	25+	16+	18+	40+	S	25+	25+	S	S	8−	S	S	S
	4	290	S	S	S	S	S	13+	S	S	S	S	S	S	S	S	S
	7	294	S	S	S	S	S	43−	S	S	S	S	S	S	S	S	S
	14	293	S	S	32−	S	S	31−	S	S	S	9+	9+	11+	12+	14+	15+

+ = Negri positive.
− = Negri negative.
[1] 0 = Traumatic death.
[2] S = Survived.
[3] Number = Day of death.

The guinea pigs receiving the vaccine had virus present in the muscle on the fourth day but otherwise all the other tissues were negative each time tested.

The blood serum removed at the time of killing the guinea pigs on the seventh and fourteenth days was then tested for the presence of virus-neutralizing antibodies. Table 6 shows that the serum of both the control and the vaccinated animals had an antibody titer of 10 M. L. D. on the seventh day and at least 100 M. L. D. on the fourteenth day.

TABLE 6.—*Serum neutralization titers in guinea pig experiment*

Sera	Dilution of fixed virus mixed with serum 0.03 cc. intracerebrally in mice												Number M. L. D. neutralization
	1:5,000				1:50,000				1:500,000				
Control guinea pig:													
7th day	[1] 11	11	11	11	11	[2] S	S	S					10
14th day	S	S	S	S	S	S	S	S					100
Immunized guinea pig:													
7th day	10	10	10	S	S	S	S	S					10
14th day	S	S	S	S	12	S	S	S					100
Normal serum	8	9	9	10	9	11	11	12	11	11	S	[3] 0	

[1] Number = Day of death.
[2] S = Survived.
[3] 0 = Traumatic death.

DISCUSSION

In the mouse experiments on the progression of street virus centrally after its peripheral introduction, two facts are evident which must be considered in interpreting the results. First, the phenolized fixed virus was a poor immunizing agent as compared to the live virus; second, either the test mice were relatively insusceptible to peripheral infection with street virus or the strain of street virus used was not highly virulent.

However, these two objections do not apply to the guinea pig experiment where the phenolized vaccine was of high immunizing potency and the street virus virulent.

In the control animals in the two experiments, the street virus remained viable and perhaps multiplied in the muscle at the site of its inoculation for at least 4 days in spite of the fact that in the tissue neutralization test the muscle of the control rabbit was able to neutralize 100 M. L. D. of virus. The spread of virus in normal animals to the peripheral nerve, thence to the spinal cord, apparently occurred within 24 to 48 hours, whereas its progression in the central nervous system to the brain was more delayed.

Vaccinated animals that had an appreciable degree of immunity (mice immunized with live virus vaccine and guinea pigs) showed virus only at the site of injection in the muscle for as long as 4 days but at no time could it be demonstrated in the peripheral or central nervous system. Immunized rabbits had virus neutralizing properties in the

sciatic nerve and spinal cord but not in the brain, and the muscle tissue did not neutralize any more than did the controls.

These results in the *in vivo* mouse experiment (using post-vaccination infection), in the *in vivo* guinea pig experiment (using post-infection vaccination), and in the rabbit tissue neutralization experiment appear to be consistent in the controls and in the animals vaccinated with material of definite immunizing potency.

However, the results with the phenolized vaccine of known low potency are quite different. In the mice the street virus remained in the muscle but quickly invaded both the peripheral and central nervous systems and at a rate even greater than in the controls. Yet in the tissue neutralization experiment the rabbit immunized with this low potency vaccine had virus neutralizing properties in the sciatic nerve and brain. In view of the rapid spread of the street virus into the central nervous system in these mice, it is interesting that it has been our experience in several experiments with guinea pigs that where street virus was introduced peripherally, then immunization started with a vaccine known to be low in immunizing power, the incubation period has been shorter, and occasionally the mortality higher in the vaccinated than in the control animals.

It is difficult to interpret the role of the serum neutralizing antibodies in immunity to rabies. There was no difference in antibody titer between the control and immunized guinea pigs either on the seventh day or the fourteenth day. At the time the street virus was present in the cord and brain of the control animal its serum neutralized at least 100 M. L. D. Furthermore, in the rabbit tissue neutralization experiment there was no definite correlation between the serum antibody titers and the tissue resistance of the two rabbits.

SUMMARY

In normal mice and guinea pigs peripherally introduced street virus remained viable in the muscle for at least 4 days and invaded the nervous system within 24 to 48 hours.

In vaccinated mice and in guinea pigs being vaccinated the peripherally introduced street virus remained viable in the muscle but did not invade the nervous system.

In mice receiving a vaccine of low potency the spread of peripherally introduced street virus appeared to be increased.

There was no definite relationship between the development of serum neutralizing antibodies and immunity to actual infection.

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THE INCIDENCE OF CANCER IN DETROIT AND WAYNE COUNTY, MICHIGAN, 1937[1]

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This is the fourth of a series of papers concerning the incidence of cancer in the United States. The reader who has followed the three earlier studies of Atlanta, Chicago, and Pittsburgh (*1*, *2*, *3*) will recall that this survey attempts to determine certain facts about the incidence, prevalence, and the various distributions of malignant neoplasms. The procedure followed has been described in previous papers. Here, it is sufficient to point out that reports were collected from all doctors practicing in the area, and from all hospitals, concerning any malignant growth seen by them during the calendar year 1937. This method was used in each of the cities selected for the sampling survey.

The fourth area to be surveyed consisted of the city of Detroit, Michigan, and the remainder of Wayne County. The 1930 census gave a population of 1,888,946 for this county. There were 2,116 doctors and 101 hospitals in this area in 1937, and reports were secured from 2,053 of the doctors and from 99 of the hospitals.[2] Since 10 hospitals and 90 doctors submitted reports in conjunction with other hospitals and doctors, there were actually 89 separate reports from hospitals and 1,963 separate reports from doctors.

NUMBER OF CASES REPORTED

The total number of cases of malignant neoplasms seen or treated in Detroit[3] in 1937 was reported as 5,833. Of these, 2,224 cases were in males, and 3,609 in females; 5,373 were residents of Detroit and 460 were nonresidents. In addition to this number, 217 of the persons who died during the year with cancer listed on the death certificates as a cause of death were not reported in the 5,833 cases mentioned above. If these are included, 6,050 cases of cancer were obtained in the Detroit survey.

Table 1 gives the number of resident death certificates (including resident cancer death certificates which were not reported as cases) and the number of cases that were reported for residents. Because satisfactory population figures will not be available until the 1940

[1] From the Division of Public Health Methods, National Institute of Health.

The data for Wayne County were collected under the supervision of Miss Bess Cheney with the assistance of Miss Elizabeth Leighton. Miss Cheney also supervised the tabulation of the data. Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project No. 65-2-23-356. The entire survey was under the direction of Harold F. Dorn.

[2] The two institutions listed as hospitals from which no reports were obtained were both small sanitoria. It is believed that if there had been any cases of cancer seen in these homes the number of cases would have been very small.

[3] "Detroit" will be used throughout this paper to designate this entire study area.

census data are released, the ratio of the total number of resident cancer cases to total resident cancer deaths has been used to make possible some comparisons of the relative prevalence[4] among the various cities. By applying this ratio to the cancer death rate for 1930, it is possible to obtain a prevalence rate based only on the assumption that the cancer death rate has not changed from 1930 to 1937. Since the rate increases slowly this will give a conservative approximation of the real rate. The ratio for total resident cases was 3.2 cases per death. This is slightly higher than the similar ratios in Pittsburgh (2.9) and in Chicago (2.6), but considerably lower than the Atlanta ratio of 5.3. It will be noted that this ratio is significantly higher for females than for males and is higher for white than for colored persons. Since the 1930 cancer death rate in Detroit was 73.9 per 100,000 population, the prevalence rate may be approximated by applying the above ratio (3.2), giving at least 236 cases per 100,000 population.

TABLE 1.—*Number of reported cases and recorded deaths from cancer, with the ratio of total resident cases to resident deaths, by sex and color, Wayne County, Mich., 1937*

	Number of individual cases or deaths								
	Total			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Reported cases	5,833	2,224	3,609	5,599	2,159	3,440	234	65	169
Deaths from cancer [1]	1,981	917	1,064	1,867	872	995	114	45	69
Reported as a case	1,764	820	944	1,661	781	880	103	39	64
Not reported as a case	217	97	120	206	91	115	11	6	5
Total resident cases [2]	5,590	2,143	3,447	5,346	2,072	3,274	244	71	173
Resident death certificates	1,726	801	925	1,623	762	861	103	39	64
Ratio (resident cases per resident death)	3.2	2.7	3.7	3.3	2.7	3.8	2.4	1.8	2.7

[1] From Bureau of Vital Statistics.
[2] Includes resident cases from death certificate only, as well as all reported resident cases.

The ratio of total resident cases to resident deaths used here is only one of numerous ratios that might be computed. For comparisons among various cities the ratio of resident cancer cases treated in 1937 (excluding the reported cases which were only under observation) to resident deaths would have certain advantages. It would not be affected by the varying thoroughness with which cases of cancer are followed up subsequent to treatment, and it would avoid the relatively greater underreporting of cases under observation. This particular ratio for Detroit is 2.4. Figures for the cities previously surveyed are: Atlanta, 4.0, Chicago, 2.3, and Pittsburgh, 2.4.

[4] Strictly speaking, "prevalence" of a disease refers to the number of persons in the population who have the disease at some one particular time. The ratios used here are based on the total number of persons seen with cancer during one year, whether or not first discovered in the year or dying in the year. However, cancer is a chronic disease and the proportion of the population afflicted does not vary greatly within short periods of time.

It should be recognized that a comparison of prevalence in various cities by using the ratio of cases to deaths has a number of limitations. It fails to allow for variations in total death rates among the cities being compared, and it fails to take into account the particular distribution of the cases among sites (i. e., the parts of the body affected by the malignant growth) of widely varying fatality. In addition, it is subject to whatever variations may exist among the cities in the completeness with which the cases were reported. That such underreporting does exist is clearly recognized and the reasons for it, as well as attempted estimates of its extent, have been discussed in an earlier paper (*3*). One thing can be said definitely: the prevalence of cancer here established is a minimum, and the actual existing number of cases is greater than the number reported in these surveys.

DUPLICATIONS IN REPORTING

The amount of underreporting would be definitely higher were it not for the fact that reports were sought from all the sources that might have seen any particular patient. As a result of this method, cases were found to have been reported by only one doctor or hospital which may actually have been seen and which should have been reported by two or more such sources. But even though one source failed to report such a case, it was included in the survey if it was reported by another source. While the failure of a physician to report a case will minimize the amount of duplication, it will not affect the total number of cases unless that particular case happens to be reported by no one else. Since there was a great deal of duplication in the reporting—all of which was eliminated before the figure of 5,833 was obtained—it is clear that the error of underreporting would have been much greater had it not been for the method of collecting reports from all sources.

The extent of duplication in the reporting is shown in table 2 and appendix table 2. About 20 percent of the cases were reported by more than one source, and 3.6 percent were reported by three or more sources. This is considerably less duplication than was found in two of the three cities already surveyed. The third city (Atlanta) had an even lower percentage of duplicated cases, but in that area there was a high proportion of skin cancers, many of which are seen by one source only. Just why malignant growths are seen by only one source more often in Detroit than in other cities is not immediately apparent. The explanation may be in the local facilities available.

TABLE 2.—*Percentage of cases reported by various sources, by number of sources, and by sex and color, Wayne County, Mich., 1937*

Reported by	Percent of cases								
	All cases combined	Both sexes by color		All colors by sex		White		Colored	
		White	Colored	Male	Female	Male	Female	Male	Female
Nature of source									
Doctor(s) only	27.7	28.4	10.3	25.6	29.0	26.2	29.8	7.7	11.2
One doctor only	*26.3*	*27.0*	*9.4*	*24.5*	*27.5*	*25.0*	*28.3*	*7.7*	*10.1*
Hospital(s) only	58.8	58.0	79.9	62.7	56.5	62.0	55.4	86.2	77.5
One hospital only	*54.2*	*53.6*	*68.4*	*58.0*	*51.8*	*57.4*	*51.2*	*78.5*	*64.5*
Doctor and hospital	13.5	13.6	9.8	11.7	14.6	11.8	14.7	6.2	11.2
Any combination of sources	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of sources									
One source only	80.5	80.6	77.8	82.5	79.3	82.4	79.5	86.2	74.6
Two sources only	15.9	15.8	16.2	14.2	16.9	14.4	16.8	9.2	18.9
Three or more sources	3.6	3.5	6.0	3.3	3.9	3.2	3.7	4.6	6.5
Any number of sources	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

REPORTING SOURCE

Table 2 also shows the percentages of all cases that were reported by doctors, hospitals, or both. Nearly 59 percent of the cases were seen by hospitals only; 54 percent were seen by one hospital only. Doctors alone reported almost 28 percent of the cases, while the remaining 13 percent were reported by both doctor and hospital. There is considerable difference in the proportions reported by doctors and by hospitals when the data are considered according to color. Twenty-eight percent of the cases among white persons were reported by doctors only, and an additional 14 percent by doctors and hospitals, making a total of 42 percent reported by doctors. Only 10 percent of cases among colored persons were seen by doctors only and slightly less than 10 percent by doctors and hospitals. Only 20 percent of the cases among colored persons were reported by a doctor—less than half as many as among white persons.

TABLE 3.—*Percentage of cases reported by various sources for each primary site group, with percentage of cases that were reported only once, Wayne County, Mich., 1937*

Primary site	Percent unduplicated	Percent reported by—		
		Doctor(s) only	Hospital(s) only	Doctor(s) and hospital(s)
Buccal cavity	84.6	24.7	66.4	8.9
Digestive tract	82.2	31.7	55.3	13.0
Respiratory system	80.6	21.1	62.4	16.5
Genitourinary system	76.6	25.5	59.5	15.0
Breast	75.5	26.4	55.2	18.4
Skin	91.4	30.3	65.2	4.5
Brain	94.1	45.6	50.0	4.4
Bones	83.1	25.2	64.2	10.5
All others	85.5	28.6	61.8	9.6
All sites	80.5	27.7	58.9	13.4

The extent of duplication and the extent to which the cases were reported by a particular source are shown in table 3 and appendix table 3 for 9 groups of primary sites. Certain sites (notably breast and genitourinary) are duplicated more often than are all sites combined, while malignant growths of the brain, skin, and buccal cavity are more frequently reported by one source only.

SPECIALIZATION IN FIELD OF CANCER TREATMENT

The number and percentage of sources reporting any specific number of cases appear in table 4 and appendix table 4. It is seen that 57 percent of the sources reported having had no case of cancer in 1937 (57.8 percent for doctors; 40.5 percent for hospitals). One case only was reported by 20.6 percent of the doctors and by 6.7 percent of the hospitals; 1.4 percent of the doctors and 32.6 percent of the hospitals reported over ten cases of cancer; and only 0.5 percent of the doctors and 23.6 percent of the hospitals reported having had more than twenty cases of malignant tumors during the year.

Let us consider the proportion of all cases reported that each of these groups (the one-case group, etc.) contributed, in relation to the number of doctors (or hospitals) in that group. The 20.6 percent of the doctors each of whom reported only one case accounted for only 15.5 percent of all the cases reported by doctors, while the 6.7 percent of the hospitals, each with one case, reported 0.1 percent of all the hospital cases. If we combine with these the sources reporting no cases we see that 78.4 percent of the doctors had each seen less than two cases of malignant neoplasm and that the reports of these doctors accounted for only 15.5 percent of the total number of cases reported by doctors. Less than two cases each were reported by 47.2 percent of the hospitals, constituting only 0.1 percent of all cases reported by hospitals.

TABLE 4.—*Percentage distribution of reporting sources by number of cancer cases reported, with the corresponding percentage distribution of cases, Wayne County, Mich., 1937*

Number of cases reported by each source	All sources		Doctors		Hospitals	
	Percent of all sources reporting	Percent of all cases reported	Percent of all sources reporting	Percent of all cases reported	Percent of all sources reporting	Percent of all cases reported
No cases	57.0	0	57.8	0	40.5	0
One or more cases	43.0	100	42.2	100	59.5	100
One case	*20.0*	*5.5*	*20.6*	*15.5*	*6.7*	*.1*
Two to five cases	*17.3*	*13.7*	*17.4*	*37.7*	*13.5*	*.8*
Six to ten cases	*2.9*	*5.9*	*2.7*	*15.2*	*6.7*	*1.0*
Eleven to twenty cases	*1.3*	*4.8*	*1.0*	*9.4*	*9.0*	*2.3*
Over twenty cases	*1.5*	*70.1*	*.5*	*22.2*	*23.6*	*95.8*
Total reporting	100.0	100.0	100.0	100.0	100.0	100.0

At the other end of the range are the 1.5 percent of the doctors, and 32.6 percent of the hospitals each reporting over 10 cases. These doctors accounted for 31.6 percent of all cases reported by doctors, and these hospitals for 98.1 percent of all cases reported by hospitals. The process of concentration is carried still further if we consider those reports listing over 20 cases each. Only 0.5 percent of the doctors are in this group but they contributed over one-fifth of all cases reported by doctors. Of the total number of hospital cases 95.8 percent were reported by 23.6 percent of the hospitals.

It is seen that malignant neoplasms tend to be treated by a relatively small number of doctors and hospitals. In Detroit, 30 reports (9 doctors and 21 hospitals), out of the 2,052 received, included 5,248 cases of the total of 7,481 (duplicated and unduplicated). The principal reasons for this are that a large number of doctors specialize in a particular field (such as pediatrics, neuropathology, etc.) in which cancer is relatively rare, and a number of institutions likewise are devoted to some particular field (as nursing homes, tuberculosis sanatoriums, mental hospitals, etc.). Then, too, the nature of cancer treatment is such that the relatively few persons who accept such cases (dermatologists, surgeons, roentgenologists, and radiologists) become specialists in the field.

CONFIRMATION OF DIAGNOSES

In these cancer incidence surveys the diagnosis of the reporting hospital or doctor determined whether the case was classed as a malignant growth. Cases in which only a clinical diagnosis had been made were accepted. However, a record was made of whether or not the diagnosis had been confirmed by a microscopic examination of the tissue; in 78 percent of all the cases in Detroit such an examination was reported. The proportion of diagnoses made by biopsy (or necropsy) varied with the site, being highest in sites easily accessible, such as breast, genitourinary system, and buccal cavity, and lowest in sites such as respiratory system, digestive tract, and brain. (Skin cancers, where a biopsy often would disfigure, are the exception to this.) The proportion of microscopic examinations made among the Detroit cases was definitely higher than in any of the cities previously surveyed. (The figure for Detroit was 78 percent, while the percentages for Atlanta, Chicago, and Pittsburgh were, respectively, 52, 70, and 62.) This is true throughout the various sites and for cases reported only by a doctor as well as for cases reported by a hospital.

DISTRIBUTION OF CASES BY PRIMARY SITE

There were marked differences in the distribution of the cases of cancer among the various sites. As in the other cities surveyed, the sites that were most frequent among males were not the same as those

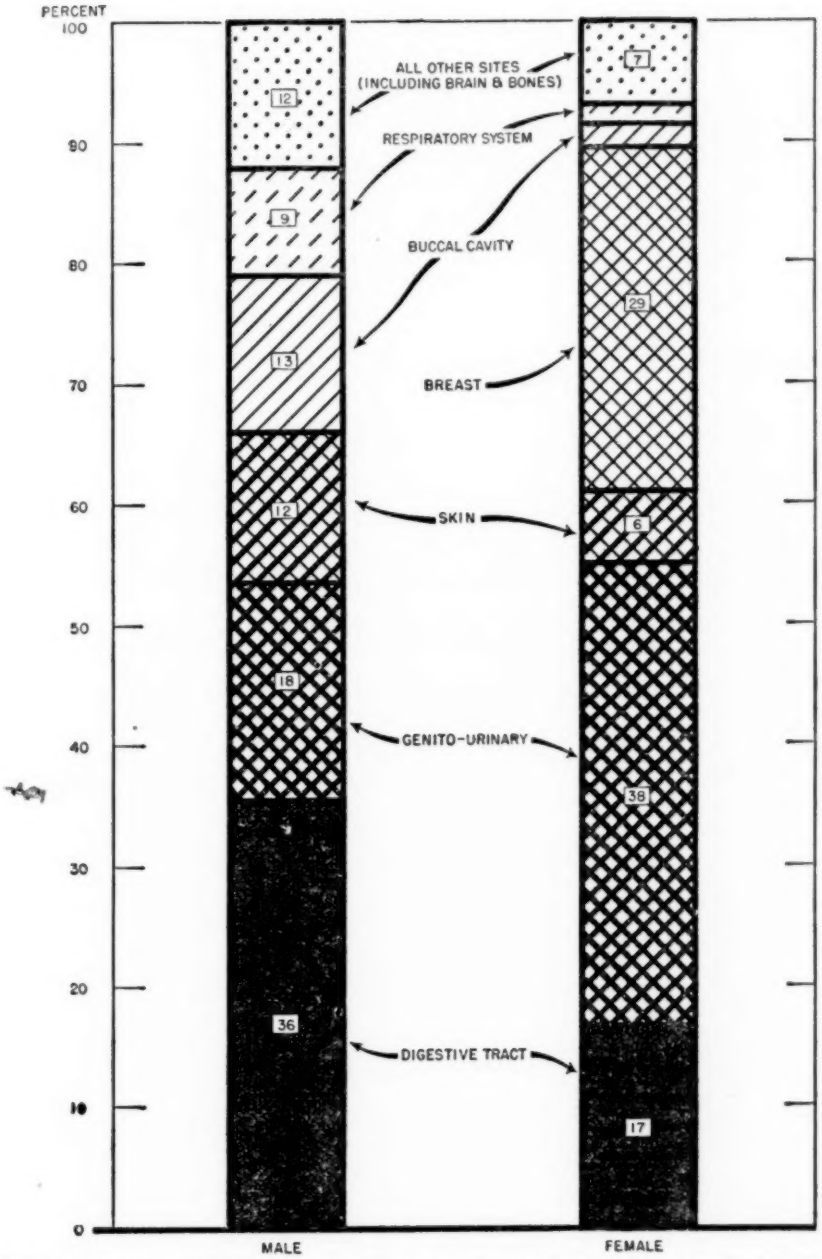

FIGURE 1.—Percentage distribution of cases of cancer by primary site, for males and for females, Wayne County, Mich., 1937.

most frequent among females. For males, 36 percent of the cases were in the digestive tract, 18 percent were primary in the genito-urinary system, and 25 percent were cancers of either skin or buccal cavity. For females, however, only 8 percent of the cases were malignant growths of the skin or buccal cavity, 17 percent were

primary in the digestive tract, while 38 percent were primary in the genitourinary system. Genitourinary cancers, along with carcinoma of the breast, constituted 67 percent of the total number of cases among females.

TABLE 5.—*Percentage of all cancer cases with a microscopically confirmed diagnosis, by primary site, and whether reported by a hospital, Wayne County, Mich., 1937*

Primary site	Percent of cases diagnosed microscopically		
	All reports	Reported by doctor only	Hospital reports
Buccal cavity	82.9	62.5	89.6
Digestive tract	63.8	50.0	70.2
Respiratory system	64.0	60.8	64.9
Genitourinary system	85.5	73.7	89.5
Breast	87.1	72.5	92.4
Skin	77.3	48.7	89.7
Brain	70.6	61.3	78.4
Bones	76.8	66.7	80.3
All others	77.8	65.4	82.8
All sites	78.0	62.8	83.9

[1] This group includes both cases on which the only report was from a hospital and cases reported by both hospital and doctor.

Table 6 and appendix table 6 list the numbers and percentages of cases for many specific sites, as well as for the broad groups of sites used in the earlier papers.

TABLE 6.—*Percentage distribution of reported cases of cancer by sex, color, and primary site, Wayne County, Mich., 1937*

Primary site	Total		White[1]	
	Male	Female	Male	Female
Buccal cavity	13.1	1.9	13.4	1.9
Lip	7.0	.3	7.1	6.3
Tongue	1.9	.2	2.0	.3
Mouth	1.0	.2	1.	.2
Jaw	.6	.2	.7	.2
Pharynx	.6	.1	.6	.1
Others	2.0	.9	2.0	.8
Digestive tract	35.8	16.7	35.4	16.9
Esophagus	1.8	.6	1.8	.4
Stomach, duodenum	14.7	4.3	14.6	4.4
Intestines	7.6	4.9	7.6	4.9
Rectum, anus	7.4	4.0	7.3	4.1
Liver, biliary passage	1.9	1.8	1.9	1.9
Pancreas	1.8	1.0	1.6	1.0
Mesentery, peritoneum	.6	.2	.6	.2
Respiratory system	8.7	1.3	8.6	1.3
Larynx	2.0	.3	2.0	.3
Lungs, pleura	6.5	.9	6.4	.9
Others	.2	.1	.2	.1
Genitourinary system	17.6	38.3	17.7	37.6
Uterus		30.5		29.8
Kidneys	2.3	.7	2.3	.7
Bladder	4.4	1.5	4.5	1.6
Prostate	8.7		8.7	
Others	2.2	5.6	2.2	5.5
Breast	.1	28.6	.1	28.8
Skin	12.2	6.0	12.3	6.2
Brain	2.1	.6	2.2	.6
Bones	2.7	1.0	2.5	1.0
Others	7.7	5.6	7.8	5.7
Total	100.0	100.0	100.0	100.0

[1] Because of the small number of cases reported among colored persons, the percentage distribution was not computed.

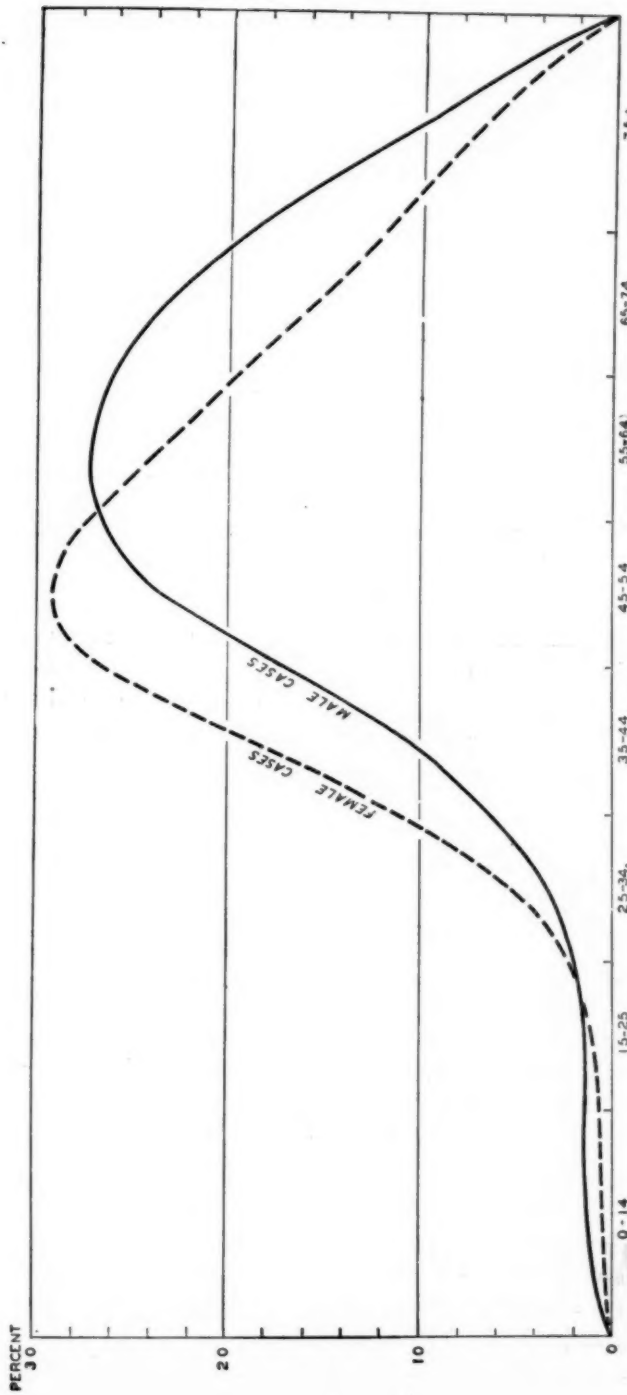

FIGURE 2.—Percentage distribution of cases of cancer by age of patient, for males and for females, Wayne County, Mich., 1937.

DISTRIBUTION OF CASES BY PATIENT'S AGE

There were 1,222 cases of malignant neoplasm among persons under 45 years of age, representing 22 percent of all the cases of known age. Ninety-eight persons, nearly 2 percent of the total number, were under 25 years of age. These figures are for both sexes combined. There are differences in age distribution between cases in males and females. As in the cities already studied, the female cases are relatively concentrated in the ages from 35 to 55. Over 47 percent of all cases among females are in those groups, as compared with only 33.4 percent of the male cases. Of the total cases, 26.7 percent (34.6 percent for males and 22.5 percent for females), occurred in persons who were 65 years of age or older.

TABLE 7.—*Number and percentage of cases of cancer of known age, by age and sex, Wayne County, Mich., 1937*

Age group	Percent of cases						Number of cases		
	In each age group			In or below each age group			Total	Male	Female
	Total	Male	Female	Total	Male	Female			
Under 15	0.7	1.3	0.3	0.7	1.3	0.3	40	28	12
15–24	1.0	1.3	.9	1.7	2.6	1.2	58	28	30
25–34	4.5	3.3	5.2	6.2	5.9	6.4	255	72	183
35–44	15.3	10.2	18.4	21.5	16.1	24.8	869	223	646
45–54	26.8	23.2	29.1	48.3	39.3	53.9	1,529	507	1,022
55–64	25.0	27.1	23.6	73.3	66.4	77.5	1,422	591	831
65–74	18.3	23.4	15.2	91.6	89.8	92.7	1,043	510	533
75 and over	8.4	10.2	7.3	100.0	100.0	100.0	479	224	255
All known ages	100.0	100.0	100.0	----	----	----	[1] 5,695	2,183	3,512

[1] One hundred and thirty-eight cases (40 male, 98 female) of unknown age are excluded.

DISTRIBUTION BY AGE AND PRIMARY SITE

An examination of the age distributions of cases in each of the different site groups reveals distinct differences among the sites. Because the site distributions are different for males and females, the cases are considered separately by sex in tables 8 and 9. For only two sites, brain and bones, was a major portion of cases in the age groups under 45 years of age. Among males 64.4 percent of the malignant tumors of the brain were found in the age groups under 45; for females the percentage is 47.4. Among males 48.3 percent of the malignant growths primary in the bones occurred in persons under 45, while among females exactly 50 percent of the bone cancers were in that group. For all sites combined, only 16.1 percent of the cases among males and 24.8 percent of those among females were in persons under 45 years of age. Cancer of the skin is found especially frequently among persons of older age; 42.1 percent of the cases among males and 42.3 percent of those among females are in the age groups 65 and

over. Only 22.5 percent of the total cases among females (regardless of site) and 33.6 percent of those among males are in these age groups. Cancer of the prostate likewise occurs principally in older males. The other sites tend to follow the same distribution as do all sites combined, with the exception of the respiratory system. Malignant growths primary in the respiratory system tend to be concentrated in the late middle section of the life span, from 45 to 64 years. For males 60.1 percent of all such cases and for females 69.6 percent were in these age groups.

TABLE 8.—*Percentage distribution of reported cases of cancer by age, for each site of malignant growth, males only, Wayne County, Mich., 1937*

Primary site	Percentage in each age group									Number of cases
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	All known ages	
Buccal cavity	------	------	3.9	7.4	24.6	32.6	18.9	12.6	100	285
Lip	------	------	*4.6*	*5.3*	*27.8*	*27.2*	*22.5*	*12.6*	*100*	*151*
Others	------	------	*3.0*	*9.7*	*20.9*	*38.8*	*14.9*	*12.7*	*100*	*134*
Digestive tract	0.1	0.8	2.4	11.4	22.9	29.7	24.0	8.6	100	780
Stomach	------	*.5*	*.9*	*11.5*	*23.4*	*31.2*	*24.9*	*7.8*	*100*	*321*
Intestines	------	*.6*	------	*14.1*	*20.2*	*26.4*	*27.6*	*11.0*	*100*	*163*
Rectum	------	*1.2*	*5.0*	*9.3*	*31.1*	*28.6*	*17.4*	*7.4*	*100*	*161*
Others	*.7*	*1.5*	*5.9*	*10.4*	*15.6*	*31.8*	*25.2*	*8.9*	*100*	*135*
Respiratory system	------	2.1	2.1	12.4	32.1	28.0	17.6	5.7	100	193
Lungs	------	*2.8*	*2.8*	*14.0*	*34.2*	*28.7*	*13.3*	*4.2*	*100*	*143*
Others	------	------	------	*8.9*	*26.0*	*26.0*	*30.0*	*10.0*	*100*	*50*
Genitourinary system	1.3	.5	3.2	6.0	17.6	24.6	31.6	15.3	100	386
Prostate	------	------	------	*3.7*	*9.4*	*22.0*	*45.5*	*19.4*	*100*	*191*
Others	*2.6*	*1.0*	*6.2*	*8.2*	*25.6*	*27.2*	*17.9*	*11.3*	*100*	*195*
Skin	1.5	.4	1.1	9.4	22.6	22.9	26.3	15.8	100	266
Brain	22.2	2.2	17.8	22.2	22.2	11.1	2.2	------	100	45
Bones	5.2	17.2	12.1	13.8	24.1	10.3	15.5	1.7	100	58
All others [1]	2.9	2.4	4.7	13.5	25.9	26.5	19.4	4.7	100	170
All sites	1.3	1.3	3.3	10.2	23.2	27.1	23.3	10.3	100	[2] 2,183

[1] Includes 3 cases of breast cancer, too few for separate tabulation.
[2] Forty cases of unknown age have been excluded from this table.

TABLE 9.—*Percentage distribution of reported cases of cancer by age, for each site of malignant growth, females only, Wayne County, Mich., 1937*

Primary site	Percentage in each age group									Number of cases
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	All known ages	
Buccal cavity	1.6	3.1	7.8	18.8	18.7	17.2	20.3	12.5	100	64
Digestive tract	------	.5	3.9	11.6	23.3	26.6	20.6	13.5	100	584
Stomach	------	*.7*	*3.3*	*8.5*	*18.3*	*30.7*	*21.5*	*17.0*	*100*	*153*
Intestines	------	*.6*	*5.8*	*17.9*	*25.1*	*22.0*	*16.7*	*13.9*	*100*	*173*
Rectum	------	*.7*	*5.8*	*10.9*	*29.2*	*26.3*	*16.8*	*10.2*	*100*	*137*
Others	------	------	------	*7.4*	*23.1*	*28.2*	*28.9*	*12.4*	*100*	*121*
Respiratory system	------	4.3	8.7	8.7	41.3	28.3	8.7	------	100	46
Genitourinary system	.2	.4	5.4	22.8	30.9	23.5	12.9	3.9	100	1,360
Uterus	------	*.2*	*4.7*	*25.1*	*32.2*	*24.8*	*11.1*	*3.9*	*100*	*1,089*
Others	*1.1*	*1.4*	*7.9*	*21.8*	*25.7*	*18.6*	*19.6*	*3.9*	*100*	*280*
Breast	------	.3	4.5	18.1	33.6	23.5	13.8	6.2	100	1,005
Skin	.5	1.0	3.4	13.1	17.0	22.8	20.9	21.4	100	206
Brain	5.3	------	15.8	26.3	31.6	15.8	5.3	------	100	19
Bones	------	8.3	11.1	30.6	11.1	30.6	8.3	------	100	36
All others	3.1	4.7	9.9	14.1	27.1	18.2	18.2	4.7	100	192
All sites	.3	.9	5.2	18.4	29.1	23.7	15.2	7.3	100	3,512

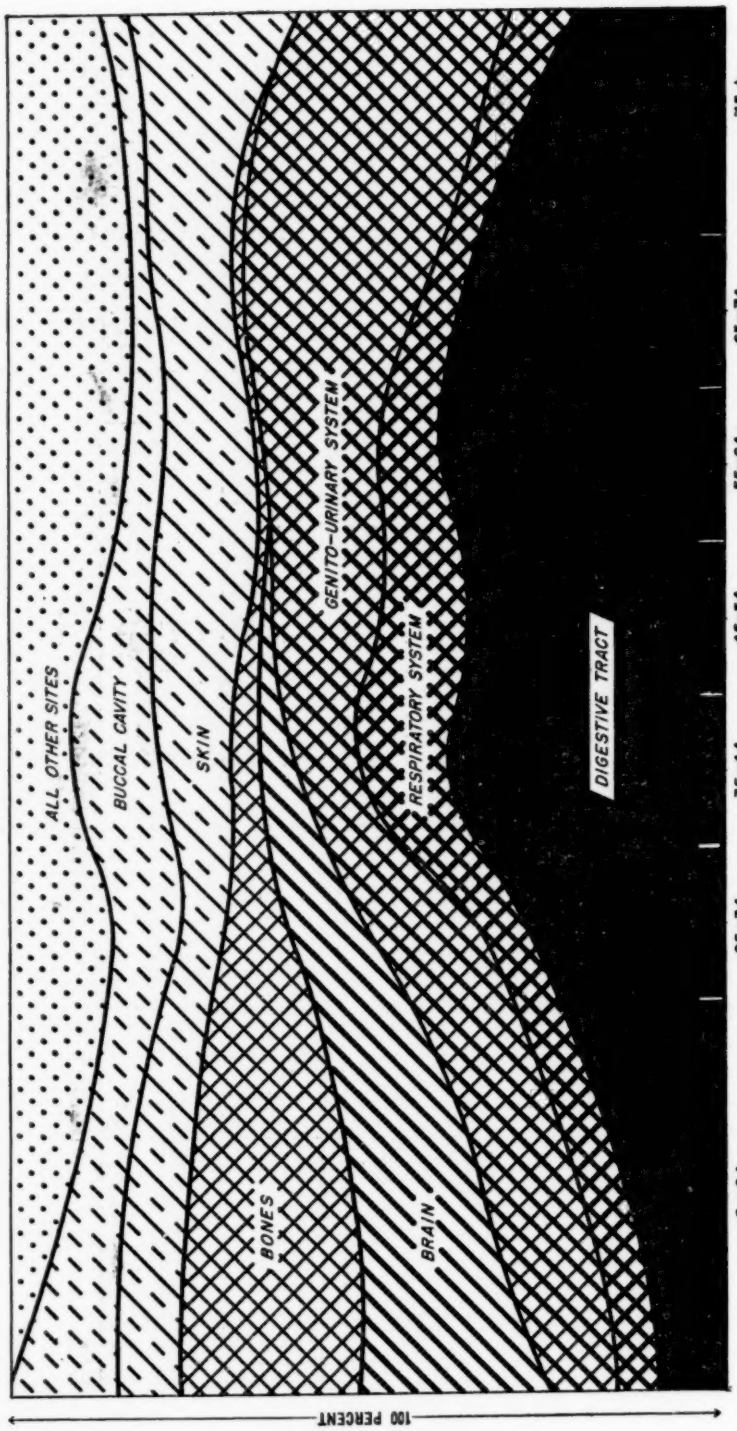

FIGURE 3.—Percentage distribution at each age group of cases of cancer, by primary site, for males, Wayne County, Mich., 1937.

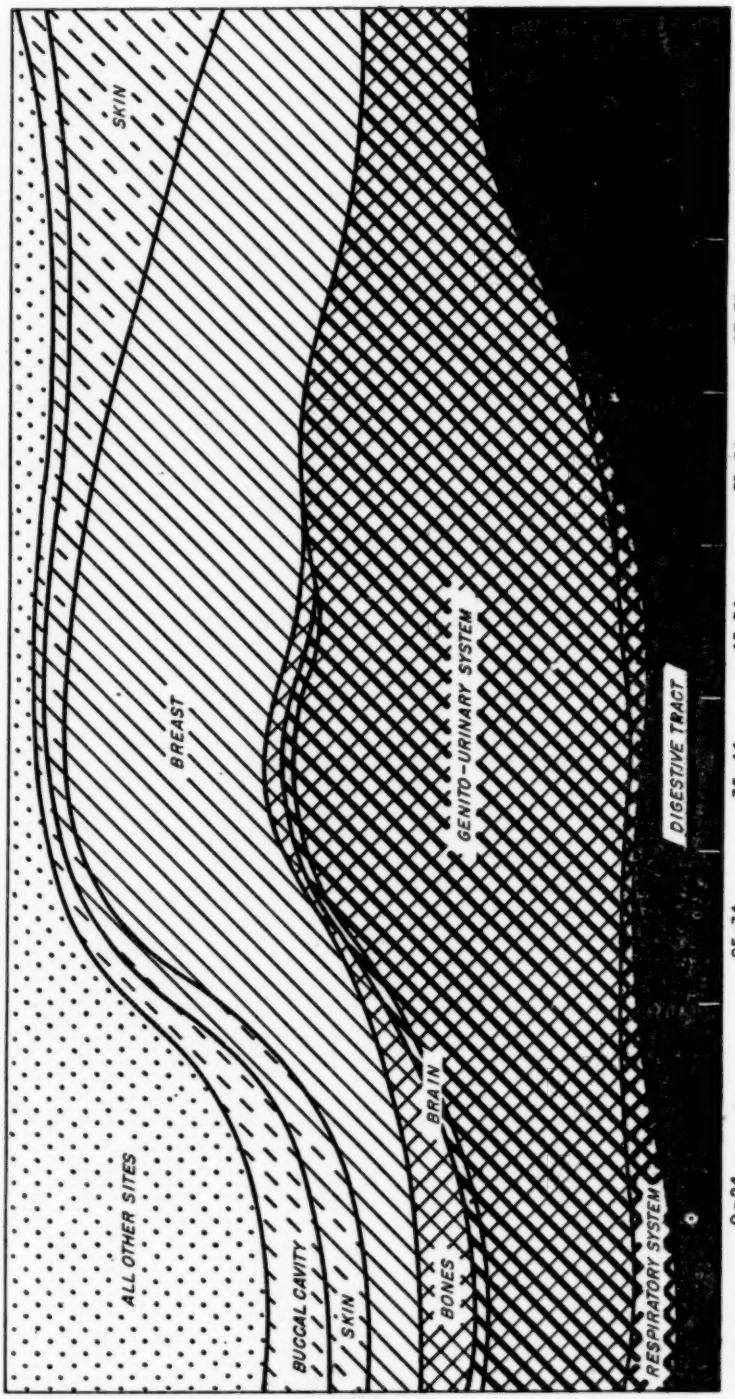

FIGURE 4.—Percentage distribution at each age group of cases of cancer by primary site, for females, Wayne County, Mich., 1937.

These same data may be examined from another viewpoint by investigating, for each particular age group, the order of importance of the various sites (tables 10 and 11). In the first age group, under 25 years, brain and bones each account for about one-fifth of all the male cases, ten times the percentage they constitute at all ages combined. Cancers of the digestive tract constitute roughly one-third of all the male cases in each age group after the age of 25. Skin, buccal cavity, and genitourinary cases become increasingly important among males at the older ages. Respiratory cancer makes up about 12 percent of the cases in the age group 45 to 54 and decreases in importance in both younger and older age groups. For females, only three sites make up a considerable portion of the cases, genitourinary, breast, and digestive tract. The first two are most important in the age groups from 25 to 75 years, while the third becomes gradually more important with increase in age. Figures 3 and 4 show the order of importance of the sites at various ages.

TABLE 10.—*Percentage distribution of reported cases of cancer by primary site, for each age group, males only, Wayne County, Mich., 1937*

Primary site	Percentage distribution							
	Under 25	25–34	35–44	45–54	55–64	65–74	75 and over	All ages
Buccal cavity	-------	15.3	9.4	13.8	15.7	10.6	16.1	13.0
Lip	-------	*9.7*	*3.6*	*8.3*	*6.9*	*6.7*	*8.5*	*7.0*
Others	-------	*5.6*	*5.8*	*5.5*	*8.8*	*3.9*	*7.6*	*6.0*
Digestive tract	12.5	26.4	39.9	35.3	39.3	36.7	29.9	35.8
Stomach	*1.8*	*4.2*	*16.6*	*14.8*	*16.9*	*15.7*	*11.2*	*14.7*
Intestines	*1.8*	-------	*10.3*	*6.5*	*7.3*	*8.8*	*8.0*	*7.5*
Rectum	*3.6*	*11.1*	*6.7*	*9.9*	*7.8*	*5.5*	*5.4*	*7.4*
Others	*5.3*	*11.1*	*6.3*	*4.1*	*7.3*	*6.7*	*5.3*	*6.2*
Respiratory system	7.1	5.6	10.8	12.2	9.1	6.6	4.9	8.8
Lungs	*7.1*	*5.6*	*9.0*	*9.7*	*6.9*	*3.7*	*2.7*	*6.5*
Others	-------	-------	*1.8*	*2.5*	*2.2*	*2.9*	*2.2*	*2.3*
Genitourinary system	12.5	16.7	10.3	13.4	16.1	23.9	26.3	17.6
Prostate	-------	-------	*3.1*	*3.5*	*7.1*	*17.0*	*16.5*	*8.7*
Others	*12.5*	*16.7*	*7.2*	*9.9*	*9.0*	*6.9*	*9.8*	*8.9*
Skin	8.9	4.2	11.2	11.8	10.3	13.7	18.7	12.2
Brain	19.6	11.1	4.5	2.0	.8	.2	-------	2.1
Bones	23.2	9.7	3.6	2.8	1.0	1.8	.4	2.7
All others	16.1	11.1	10.3	8.7	7.6	6.5	3.6	7.8
All sites	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	56	72	223	507	591	510	224	[1] 2,223

[1] Includes 40 cases of unknown age. (Actual numbers on which this table is based are given in appendix table 8.)

TABLE 11.—*Percentage distribution of reported cases of cancer by primary site for each age group, females only, Wayne County, Mich., 1937*

Primary site	Percentage distribution							
	Under 25	25–34	35–44	45–54	55–64	65–74	75 and over	All ages
Buccal cavity	7.2	2.7	1.9	1.2	1.3	2.4	3.1	1.9
Digestive tract	7.2	12.6	10.5	13.3	18.7	22.5	31.0	16.7
Stomach	*2.4*	*2.7*	*2.0*	*2.7*	*5.7*	*6.2*	*10.2*	*4.3*
Intestines	*2.4*	*5.5*	*4.8*	*5.9*	*4.6*	*5.4*	*9.4*	*4.9*
Rectum	*2.4*	*4.4*	*2.3*	*3.9*	*4.3*	*4.3*	*5.5*	*4.0*
Others			*1.4*	*2.7*	*4.1*	*6.6*	*5.9*	*3.5*
Respiratory system	4.8	2.2	.6	1.9	1.6	.8		1.3
Genitourinary system	21.4	39.9	48.0	41.1	38.5	32.8	20.8	38.3
Uterus	*4.8*	*27.9*	*38.5*	*34.1*	*32.2*	*22.5*	*16.5*	*30.5*
Others	*16.6*	*12.0*	*9.5*	*7.0*	*6.3*	*10.3*	*4.3*	*7.8*
Breast	7.1	24.6	28.1	33.0	28.4	26.0	24.3	28.6
Skin	7.1	3.8	4.2	3.4	5.7	8.1	17.3	6.0
Brain	2.4	1.6	.8	.6	.3	.2		.6
Bones	7.1	2.2	1.7	.4	1.3	.6		1.0
All others	35.7	10.4	4.2	5.1	4.2	6.6	3.5	5.6
All sites	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	42	183	646	1,022	831	533	255	[1] 3,610

[1] Includes 98 cases of unknown age. (Actual numbers on which this table is based are given in appendix table 9.)

RELATIVE FATALITY OF CANCER OF DIFFERENT PRIMARY SITES

There is a great difference in the relative fatality of malignant growths of the various sites. Carcinoma of the breast, for example, is relatively less fatal than malignant neoplasm primary in the stomach. In table 12 the percentage distribution of all of the cancer cases reported is compared with the percentage distribution of all cancer deaths. This shows the varying fatality among the several sites, for if cancer of a certain site is relatively more fatal than for all sites combined it will account for a larger percentage of the deaths than of the cases. Thus digestive tract cancers, which make up 35 percent of all cases among males, account for 55 percent of the deaths. Conversely, a site which is less fatal than the average will represent a less important part of the deaths than of the cases. Skin cancers make up 12 percent of the cases among the males but only 1 percent of the deaths. For both males and females the sites with the highest fatality are digestive tract and respiratory system, while those with the lowest fatality are skin and breast (for females only)

TABLE 12.—*Percentage distribution of all cancer deaths (including deaths obtained from death certificates only), and of all cancer cases reported, by sex, color, and primary site, Wayne County, Mich., 1937*

Primary site	White				Total			
	Male		Female		Male		Female	
	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases
Buccal cavity	5.6	12.2	1.1	1.2	5.5	11.9	1.1	1.1
Lip	.8	7.1	.2	.3	.7	7.0	.2	.3
Tongue	1.4	2.0	.2	.3	1.3	1.9	.2	.2
Mouth	1.1	1.0	.1	.2	1.1	1.0	.1	.2
Jaw	.9	.6	.4	.2	.9	.6	.4	.2
Pharynx	.5	.5	.2	.1	.6	.5	.2	.1
Other buccal	.9	1.0		.1	.9	.9		.1
Digestive tract	55.3	35.4	39.5	16.9	55.6	35.8	38.6	16.7
Esophagus	3.7	1.8	.9	.4	3.9	1.8	1.1	.5
Stomach, duodenum	26.3	14.5	13.4	4.4	25.9	14.7	13.3	4.3
Intestines	8.7	7.6	10.1	4.9	8.7	7.6	9.7	4.9
Rectum, anus	7.2	7.3	5.4	4.1	7.3	7.4	5.4	4.0
Liver, biliary passage	4.7	1.9	6.3	1.9	4.6	1.9	6.0	1.8
Pancreas	4.2	1.7	2.7	1.0	4.6	1.8	2.5	1.0
Other digestive	.5	.6	.7	.2	.6	.6	.6	.2
Respiratory system	13.3	8.6	2.7	1.3	13.4	8.8	2.6	1.3
Larynx	2.3	2.0	.2	.3	2.4	2.0	.2	.3
Lungs, pleura	8.3	5.2	1.8	.7	8.3	5.4	1.7	.7
Other	2.7	1.4	.7	.3	2.7	1.4	.7	.3
Genitourinary system	15.2	17.7	31.1	37.5	14.9	17.6	32.5	38.2
Uterus			23.0	29.8			24.5	30.5
Kidneys	2.7	2.3	.7	.7	2.5	2.3	.7	.7
Bladder	4.2	4.5	2.3	1.6	4.0	4.4	2.1	1.5
Prostate	7.5	8.7			7.7	8.7		
Other genital	.5	1.3	5.1	5.4	.5	1.3	5.2	5.5
Other urinary	.3	.9			.2	.9		
Breast	.4	.1	16.8	28.8	.5	.1	16.8	28.6
Skin	1.3	12.4	.2	6.2	1.2	12.2	.2	6.0
Brain	1.0	2.2	.7	.6	1.0	2.1	.7	.6
Bones	1.5	2.5	.6	1.0	1.4	2.7	.5	1.0
All others	6.4	8.9	7.3	6.5	6.5	8.8	7.0	6.5
All sites	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

As pointed out at the beginning of this paper, no case report was obtained during the survey for 217 cancer deaths for which records were obtained from death certificates. These cases were included in the comparison of dead cases with all cases given in table 12, but were not included in any of the other distributions (by site, age, etc.). These 217 death-certificate cases were found to be similar to all dead cases in age and site distributions. The distribution of all cases would be only slightly affected by the inclusion of these cases, since they represent only a small part (3.6 percent) of the total number of cases.

DURATION OF CASES SINCE FIRST DIAGNOSED AS CANCER

Every cancer case reported in the survey had been seen during the year 1937. But many of the cases had also been seen much earlier and were still, or again, being seen in 1937. One of the items of information collected was the date on which the patient had been first seen with cancer. It is true that this date was the time the reporting physician first saw the case, and it may have been seen earlier by some other physician who had lost the case prior to 1937 and so made no

report of his diagnosis. Thus the durations of the cases according to the reported dates first seen may somewhat understate the duration. However, in determining duration, the report of the physician is the only test that can be used.

The length of time from the date first seen, as reported on the schedule, to January 1, 1938, was considered to be the duration for all cases that were reported as alive on that date. For dead cases the period was measured to the month of death, while for cases with unknown vital status, a date midway between the date the case was last seen and January 1, 1938, was used. Table 13 lists separately by color and vital status the percentage distribution of all cases by months since first seen.

TABLE 13.—*Percentages of cases of cancer by months since first diagnosis, by color and vital status, Wayne County, Mich., 1937*

Months since first seen	Percent of cases in each duration group							
	All cases	All white	All colored	Alive		Dead		Vital status unknown[1]
				White	Colored	White	Colored	
Under 6	37.7	37.4	44.4	23.8	30.8	56.9	57.4	51.1
6–11	19.7	19.7	20.9	21.0	20.6	16.9	21.3	21.2
12–17	8.7	8.8	7.7	9.5	6.5	8.1	7.4	7.0
18–23	5.8	5.8	4.7	6.8	6.5	5.0	2.8	3.5
24–29	4.0	4.1	2.1	4.2	1.9	3.7	2.8	4.5
30–35	3.1	3.1	3.0	3.9	1.9	1.9	3.7	2.2
36–41	2.9	2.9	2.1	3.6	3.7	2.1	.9	1.9
42–47	2.2	2.1	2.6	2.7	4.7	1.1	.9	2.1
48–53	1.6	1.6	.4	2.0	.9	1.0	-------	1.6
54–59	1.6	1.6	1.7	2.1	.9	.9	1.9	.6
60–65	1.2	1.2	1.7	1.7	3.7	.1	-------	1.4
66–71	1.1	1.1	.9	1.7	1.9	.3	-------	.3
72–77	.8	.8	.4	1.1	-------	.4	.9	.6
78–83	1.2	1.3	.9	2.0	1.9	.2	-------	.2
84–89	1.1	1.1	.4	1.8	.9	.2	-------	.3
90–95	1.3	1.3	1.3	2.2	2.8	.1	-------	-------
96 and over	6.0	6.1	4.7	9.8	10.3	1.0	-------	1.4
All durations	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases (known duration)	5,805	5,571	234	3,173	107	1,790	108	627

[1] 19 of these cases were colored; the others were white.

"Duration" is used here to mean the number of months since date of first diagnosis as discussed previously. The duration of 42 percent of the cases was 12 months or more. This means that over 2,400 cases had been under care or treatment for at least 1 year by the end of 1937. Of those cases, over 700 (nearly 14 percent) had a duration of 5 years or over, and 350 (6 percent) had a duration of 8 or more years. However, when the cases are considered by vital status it appears that some of the cases of long duration ended in death during the study year. There were 18 cases with over 95 months' duration listed as dead, and 44 cases that had been first seen at least 6 years prior to date of death in 1937. Of the cases alive at the end of the study year, nearly 10 percent had a duration of 8 years or more, and over half had a duration of at least 1 year.

The cases among white persons tend to have a longer duration than those among colored persons. In the group with a duration of less than 6 months are found 65 percent of the colored cases and only 57 percent of the white cases. Moreover, 22 percent of the white cases had at least 3 years' duration while less than 17 percent of the colored had been diagnosed that long prior to the end of the survey year. These are indications of the relatively late stage at which colored people receive treatment for cancer.

The duration of cases varies greatly with the primary site of the malignant growth. This is, in great part at least, a reflection of the varying fatality among the sites. For example, only 3 percent of malignant growths primary in the brain had a duration of 3 years or more, while over 30 percent of the skin cancers had that duration. The other sites range between these extremes, respiratory system, digestive tract, and bones having relatively short durations, while breast, buccal cavity, and genitourinary have longer durations. Table 14 lists the percentage distribution of the cases in each primary site by their duration in months and (except for three sites) gives the figures separately for cases alive at the end of the study year and for dead cases. The duration of the dead cases is markedly shorter than that of the live ones. However, this separation does not eliminate the effect of the relative fatality of the various sites on the living cases, for in the more fatal sites there will be fewer living survivors in the longer duration groups.

TABLE 14.—*Percentage distribution of cases by months since first seen, primary site, and vital status at end of survey, Wayne County, Mich., 1937*

Primary site	Percentages of cases in each duration (months since first seen) group												Numbers of cases[2]
	Under 6	6–11	12–17	18–23	24–29	30–35	36–41	42–47	48–53	54–59	60 and over	Total	
Buccal cavity:													
Alive	16.4	21.8	10.1	5.5	4.6	2.9	4.2	2.5	2.1	3.4	26.5	100	238
Dead	*37.8*	*24.3*	*21.6*	*1.4*	*2.7*	*1.4*	*1.4*	*1.4*	*2.7*	*2.7*	*2.7*	*100.*	*74*
Digestive tract:													
Alive	37.9	22.1	9.1	6.9	3.6	3.2	2.7	2.7	1.1	1.9	8.8	100	475
Dead	*71.7*	*14.7*	*4.9*	*2.4*	*2.3*	*0.8*	*1.0*	*0.4*	*0.3*	*0.6*	*0.9*	*100*	*788*
Respiratory system:													
Alive	44.3	15.7	12.8	8.6	2.9	-----	1.4	2.9	2.9	1.4	7.1	100	70
Dead	*66.8*	*19.4*	*4.2*	*7.6*	*1.4*	*0.7*	-----	*0.7*	-----	-----	*0.7*	*100*	*144*
Genitourinary system:													
Alive	21.7	21.0	9.2	7.1	4.3	3.6	4.3	3.2	2.1	2.5	21.0	100	1,100
Dead	*47.4*	*18.9*	*10.3*	*6.1*	*4.6*	*2.9*	*3.1*	*1.3*	*1.3*	*1.3*	*2.9*	*100*	*477*
Breast:													
Alive	17.8	21.3	8.9	6.8	3.4	4.4	2.8	2.9	2.3	1.8	27.6	100	681
Dead	*29.7*	*17.8*	*10.5*	*10.0*	*9.1*	*5.5*	*5.5*	*3.2*	*1.4*	*2.3*	*5.0*	*100*	*219*
Skin[1]	22.5	19.0	10.4	7.0	4.6	5.6	4.9	1.6	2.3	1.6	20.4	100	431
Brain[1]	40.9	19.7	15.1	7.6	7.6	6.1	-----	-----	-----	-----	3.0	100	66
Bones[1]	33.7	23.3	7.0	5.8	4.6	2.3	3.5	5.8	1.2	1.2	11.6	100	86
All others:													
Alive	27.5	22.1	9.5	5.0	3.6	3.1	2.7	1.8	1.8	1.3	21.6	100	222
Dead	*62.6*	*14.0*	*9.3*	*4.7*	*2.8*	*0.9*	-----	*1.9*	*1.9*	-----	*1.9*	*100*	*207*
All sites:													
Alive	24.0	21.0	9.5	6.8	4.1	3.8	3.6	2.8	1.9	2.1	20.4	100	3,280
Dead	*57.0*	*17.2*	*8.1*	*4.8*	*3.7*	*2.0*	*2.1*	*1.0*	*0.9*	*0.9*	*2.3*	*100*	*1,893*

[1] Too few cases to give percentage distribution by vital status; percentage here refers to all cases reported, living and dead.

[2] Cases of unknown duration, 18 in all, are excluded.

The durations listed here are affected by the less complete reporting of cases of cancer under observation only. As a result the average duration of all cases is somewhat shorter than it would be if all cases under observation, which have a longer than average duration, had been reported.

CASES UNDER OBSERVATION ONLY IN 1937

It will be recalled that the cases of cancer discussed here include all cases of malignant growth that were seen by a doctor or hospital during the study year. Both cases actually under treatment during 1937, and cases that were seen by the doctor during that year but were not treated are included. This last group of cases represents, in a sense, "cured" cases of cancer. Following successful earlier treatment, they had been observed in 1937 and no sign of recurrence of the malignant neoplasm had been discovered. Tables 15 to 19 are concerned with these cases which were under observation only.

Of the total number of cases reported, 1,197, or 20.5 percent, were under observation only in 1937. The percentage of such cases for females, 23, is higher than that for males, 16, and the figure is slightly higher for white than for colored persons. Examination of the cases under observation only, on the basis of the reporting source, shows that 26.8 percent of the total hospital cases were under observation only, while 16 percent of the total cases reported only by doctors were in this category.

TABLE 15.—*Percentages that cases under observation only are of all cancer cases reported, by sex, color, and reporting source, Wayne County, Mich., 1937*

Class of cases	Percentage of all cases in each class					Percentage reported by:		
	Total	Male	Female	White	Colored	Doctor(s) only	Hospital(s) only	Doctor and hospital
Cases under observation only	20.5	16.1	23.3	20.6	19.2	16.1	26.8	21.7
Cases treated in 1937	79.5	83.9	76.7	79.4	80.8	83.9	73.2	78.3
All cases	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 16 shows the percentage distribution of the 1,197 cases under observation only, by the number of months since the case had been last treated. This period was calculated from the date the case was reported as last seen to January 1, 1937. Thus every case listed here, if still alive on January 1, 1938, actually had one year longer duration than the tabulated period, as well as another year without treatment since, had any treatment been received in 1937, the case would have been excluded from this group. More exactly, the duration of each of these observed cases after cessation of treatment averages one year and one half month more than the number of months since last

treatment as recorded in the tables. Cases last treated in December 1936 were listed as zero months since last treated (whereas on the average there would have been one-half month duration), cases last treated in November 1936 were listed as 1 month, etc. Table 16 shows that about 10 percent of the cases under observation only were in the group with a duration of at least 96 months since last treatment. That is, 10 percent, 118 cases, had been under observation for at least 8 years prior to January 1, 1937, and continued under observation with no recurrence of cancer during 1937.

TABLE 16.—*Percentage distribution by months since last treated, for cancer cases under observation only, by sex and reporting source, Wayne County, Mich., 1937*

Months since last treated	Percentage distribution				
	Total cases under observation	Male	Female	Reporting source	
				Doctors only	Hospitals only
Under 6	15.8	20.2	13.9	20.8	14.1
6–11	10.4	13.4	9.2	13.1	9.7
12–17	7.2	9.0	6.4	7.3	7.0
18–23	7.5	7.3	7.6	4.6	8.3
24–29	6.1	4.8	6.7	5.0	6.5
30–35	3.9	4.2	3.8	1.5	4.7
36–41	3.2	3.9	2.9	3.8	3.0
42–47	2.6	3.4	2.3	1.9	2.8
48–53	3.1	3.4	3.0	1.9	3.5
54–59	3.2	2.8	3.3	1.5	3.7
60–65	2.6	1.7	3.0	1.2	2.8
66–71	4.5	5.6	4.0	1.2	5.5
72–77	3.6	2.8	3.9	0.8	4.5
78–83	3.8	1.7	4.6	----	4.7
84–89	3.1	2.0	3.6	----	4.0
90–95	1.8	0.8	2.1	----	2.3
96 and over	9.9	4.5	12.1	1.5	12.3
Unknown	7.7	8.5	7.5	33.8	0.6
Total	100.0	100.0	100.0	100.0	100.0

The same relative relationships between male and female cases and hospital-reported and doctor-reported cases as were seen in table 15 prevail in table 16. Just as a larger percentage of the female than of the male cases were in the group under observation, so a larger percentage of the female cases under observation are in the groups showing a longer duration since last treated. Twelve percent of these female cases (the "cured" cases) had a duration after cessation of treatment of at least 8 years prior to January 1, 1937; the figure for male cases is 4.5 percent. The corresponding figures by reporting source are 12.3 percent for hospitals only and 1.5 percent for doctors only.

An examination of the age distribution of cases under observation only shows very little difference from treated cases. Table 17 gives the percentage distributions by age for treated cases and for observed cases. There is no significant difference in distribution.

TABLE 17.—*Percentage age distributions of cancer cases under observation only during the study year, and of cases treated, Wayne County, Mich., 1937*

Age group	Percent of cases in each age group		Age group	Percent of cases in each age group	
	Cases under observation only	Treated cases		Cases under observation only	Treated cases
Under 15	0.9	0.7	65–74	17.9	18.4
15–24	1.0	1.0	75 and over	7.2	8.7
25–34	3.9	4.6			
35–44	17.3	14.7	All known ages	100.0	100.0
45–54	28.5	26.4	Number of cases	1,165	4,530
55–64	23.3	25.4			

There are marked differences between the distribution by primary site of the cases under observation only and the treated cases, as shown in table 18. Cancer of the digestive tract makes up 27 percent of all cases treated, and only 11 percent of the cases under observation; the respiratory system is the primary site of 5 percent of the treated cases, and of only 1.3 percent of the "cured" cases. Skin, breast, buccal cavity, and genitourinary, however, all are more important sites among the cases under observation than they are of the total number of cases treated.

TABLE 18.—*Percentage site distributions of cancer cases under observation only during the study year and cases treated, Wayne County, Mich., 1937*

Primary site	Percentage in each site group		Primary site	Percentage in each site group	
	Cases under observation only	Treated cases		Cases under observation only	Treated cases
Buccal cavity	8.7	5.5	Brain	1.1	1.2
Digestive tract	10.7	27.4	Bones	1.2	1.7
Respiratory system	1.3	4.9	All others	6.7	6.3
Genitourinary system	35.5	29.1			
Breast	21.9	16.7	All sites	100.0	100.0
Skin	12.9	7.2			

Table 19, listing the percentage distribution of each site by years since last treated (up to January 1, 1937), shows the same variation among the sites. For sites which predominate in the group under observation only, buccal cavity, breast, skin, and genitourinary, there is a larger percentage of cases with longer durations since treatment. Only 3 percent of the observed cases that were primary in the digestive tract had been in the "cured" category for at least 8 years, while 15.4 percent of the observed cases primary in the buccal cavity and 14.5 percent of the breast cases had had that long a duration subsequent to treatment.

TABLE 19.—*Percentage distribution of the cases under observation only in each primary site group by number of years since last treated, Wayne County, Mich., 1937*

Years since last treated	Percentage distribution						
	Buccal cavity	Digestive tract	Genito-urinary	Breast	Skin	All other sites [1]	All sites combined
Under 1	24.0	29.7	23.8	21.8	32.9	34.1	26.2
1-2	12.5	14.1	13.9	14.1	20.6	13.8	14.7
2-3	11.5	7.8	10.1	10.3	10.3	9.8	10.0
3-4	11.5	4.7	5.9	4.2	5.2	5.7	5.8
4-5	9.6	2.3	5.4	5.3	7.7	10.6	6.3
5-6	7.7	7.0	8.2	8.0	2.6	6.5	7.1
6-7	2.9	5.5	10.4	8.0	3.9	5.7	7.4
7-8	1.0	1.6	5.4	7.6	4.5	4.1	4.8
8 years and over	15.4	3.1	9.4	14.5	9.7	4.1	9.9
Unknown	3.8	24.2	7.5	6.1	2.6	5.7	7.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] There were too few cases in the respiratory system, brain, and bones for separate listing, and these cases are here included in "all other sites."

CANCER CASES ORIGINATING IN 1937

The problem of incidence concerns the number of persons "coming down with" a disease in a set period of time. In computing an incidence rate, only cases of cancer that originated (or were first diagnosed) during the year should be considered. These cases have been tabulated separately but in the absence of recent population figures no rates have been computed. The ratios of resident cancer cases to resident cancer death certificates can be computed for cases originating in 1937 just as was done for all cases. These ratios are 1.7, 1.6, and 1.8 to 1 for total, male, and female cases, respectively. Using the ratio for total cases in conjunction with the 1930 death rate from cancer for Detroit, a rough approximation of the incidence rate may be arrived at. In 1930 there were 73.9 deaths from cancer per 100,000 persons in Detroit. If that rate obtained throughout the survey year, 1937, since there were 1.7 new cases in 1937 for every death, there would have been at least 126 new cases of cancer per 100,000 population. Inasmuch as the cancer death rate is increasing almost everywhere, this would seem to be a conservative approximation of the incidence rate.

TABLE 20.—*Number of cancer cases first seen in 1937, by sex, color, vital status, and residence, Wayne County, Mich.*

Vital status (As of Jan. 1, 1938)	Number of cases first seen in 1937							
	Total		White				Colored[1]	
			Resident		Nonresident			
	Male	Female	Male	Female	Male	Female	Male	Female
Alive	562	914	486	798	58	79	18	37
Dead	587	521	528	452	32	28	27	41
Death certificate located	*509*	*446*	*468*	*394*	*14*	*15*	*27*	*39*
Death certificate not located	*78*	*75*	*60*	*58*	*18*	*13*	------	*2*
Unknown	146	273	124	227	20	37	2	9
Total reported	1,295	1,708	1,138	1,477	110	144	47	87
Cases from death certificate only	97	120	91	115	------	------	6	5
Total death certificates of residents	------	------	762	861	------	------	39	64

[1] All the colored cases were residents except one female, vital status unknown.

The cancer cases originating in 1937 are listed by sex, color, residence, age, and primary site in appendix tables 21 and 22. From these data tables 21 and 22 have been constructed, showing the percentage distributions of these cases by sex, age, and primary site. In general the distributions are very similar to those for all cases. There are two differences between the distribution of the cases first seen in 1937 and all cases reported. There are, in the former, relatively more cases of cancer primary in the digestive tract and in the respiratory system, and relatively fewer cancers of the skin, breast, and genitourinary system. The other difference is that the cases originating in 1937 have a somewhat lower median age.

TABLE 21.—*Percentage distribution of cancer cases first seen in 1937, by primary site and sex, Wayne County, Mich.*

Primary site	Percent of cases in each site group		Primary site	Percent of cases in each site group	
	Male	Female		Male	Female
Buccal cavity	9.1	1.3	Brain	2.1	0.8
Digestive tract	42.9	23.7	Bones	2.2	1.0
Respiratory	10.4	1.5	All other sites	7.3	6.7
Genitourinary	17.4	34.7			
Breast	------	25.1	All sites	100.0	100.0
Skin	8.6	5.2			

TABLE 22.—*Percentage distribution of cancer cases first seen in 1937, by age and sex, Wayne County, Mich.*

Age group	Percent of cases in each age group		Age group	Percent of cases in each age group	
	Male	Female		Male	Female
Under 15	1.3	0.4	55–64	27.4	23.3
15–24	1.3	.9	65–74	23.0	14.8
25–34	3.2	6.4	75 and over	10.2	7.7
35–44	10.2	18.7			
45–54	23.4	27.8	All known ages	100.0	100.0

In appendix tables 23 and 24 the actual numbers of cases originating in 1937 are listed for males and for females by primary site and age of patient. The age distribution for any specific site is not significantly different from the similar distribution of all cases reported for that same site. The difference that arises in the age distribution of all cases combined, therefore, comes from the different proportions in which the several primary sites are represented among cases first seen in 1937.

SUMMARY

This paper continues the analysis of a sampling survey of cancer incidence in the United States. The fourth area surveyed, Detroit and Wayne County, Michigan, yielded a total of 6,050 cases of cancer for the calendar year 1937. Doctors and hospitals reported having treated or observed 5,833 of these cases; the remaining 217 were obtained from death certificates only. The total number of death certificates listing cancer as a cause of death in this area in 1937 was 1,764. The ratio of resident cases to resident deaths was 3.2 to 1. This is slightly higher than the ratios for Pittsburgh (2.9 to 1) and Chicago (2.6 to 1) but considerably lower than that for Atlanta (5.3 to 1). On the basis of the 1930 cancer death rate for Detroit, this ratio would represent a prevalence rate of at least 236 cases of cancer per 100,000 population.

Since the error in the reporting was on the side of underreporting, the number of cases reported here definitely establishes a minimum prevalence. The actual prevalence is thought to be slightly greater than here indicated.

About 20 percent of the cases were reported by more than one source. This duplication was carefully eliminated by use of identifying information collected with the case report and the final figures represent unduplicated cases. There were considerably more cases seen by one source only in the Detroit area than in the cities previously surveyed. The extent of duplication varied directly with the accessibility of the primary site involved.

Hospitals alone reported 58.8 percent of all the cases reported; doctors alone reported 27.7 percent; and the remaining 13.5 percent were reported by both doctors and hospitals. There was only one report on 80 percent of the cases; 16 percent were reported by two sources; and the remainder were reported by three or more sources.

The bulk of the cancer cases were treated by a relatively small number of physicians and hospitals. The 78 percent of the doctors who reported less than 2 cases of cancer each, contributed only 15 percent of the total number of cases reported by doctors, while 1.4 percent of the doctors—those reporting 10 or more cases—contributed 32 percent of all the cases reported by doctors. This was also true of the hospitals; 47 percent of them, each reporting less than 2 cases, reported only 0.1 percent of all the hospital cases, while 24 percent of the hospitals, each reporting 10 or more cases, contributed 95.8 percent.

A microscopic examination of tissue confirmed the diagnosis of malignant neoplasm in 78 percent of all the cases reported in Detroit. This is definitely higher than in any of the cities previously surveyed. The proportion of cases so confirmed varied directly with the accessibility of the site involved.

Marked differences exist between males and females in the relative frequency of various primary sites of the malignant growth. For males 36 percent of the cases were primary in the digestive tract, 25 percent in the skin or buccal cavity, and 18 percent in the genitourinary system. For females 38 percent of all cases were primary in the genitourinary system, 29 percent in the breast, and 17 percent in the digestive tract.

For cancer cases of all sites combined 2 percent of the 5,833 cases were under 25 years of age, and 27 percent were over 65 years of age. More of the cases among females than among males are concentrated in the ages from 35 to 55 years. This is largely due to the relatively large numbers of cases of genitourinary and breast cancer found among females in those age groups. The primary sites show sharp differences in age distribution. Skin cases are largely found in the older age groups, while cancer primary in the brain or bones is found most often in young persons. Respiratory malignant growths are concentrated in the late-middle section of the life span, the ages 45 to 64 including over 60 percent of all male and 70 percent of all female cases.

There are marked differences in the relative fatality of malignant growths of various primary sites, as is shown by a comparison of the percentage site distributions of all cases and of all deaths. The sites with the lowest fatality are skin and breast, while cancer primary in the digestive tract or the respiratory system shows the greatest fatality.

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Duration, the time from the date first seen to the end of 1937 (for live cases) or to date of death (for cases dying in 1937), was found to be 1 year or more for 42 percent of the cases. There were 14 percent of the cases with a duration of 5 or more years, and 6 percent with a duration of 8 years or over. On the other hand, 38 percent of all cases reported had a duration of less than 6 months. For dead cases, 57 percent had less than 6 months' duration. The duration varies sharply among the sites.

Cases collected in the survey were divided into two categories, those actually receiving treatment in 1937, and those that were observed in 1937 for possible recurrence but were not treated. This latter group, the "cured" cases of cancer, made up 20.5 percent of all cases reported. There was a larger percentage of cases in this group included in hospital reports than in doctors' reports. Ten percent of the 1,197 cases under observation had had a duration, after cessation of treatment, of at least 8 years; nearly 30 percent, at least 5 years. Relatively more female than male cases are in the group under observation, and the period of observation without treatment is longer for females than for males. The age distribution of the cases under observation only is similar to that of the treated cases; the site distribution is different in that the sites with relatively high fatality are represented in smaller proportion in the observed cases.

There were 3,003 cases of cancer originating in 1937. Of these cases 1,295 were male, and 1,708 were females; 2,748 were resident, and 255 were nonresident; 2,869 were white, and 134 were colored. The ratio of resident cancer cases originating during 1937 to all resident deaths is 1.7 to 1. The similar ratios for male and female cases are 1.6 and 1.8, respectively. On the basis of the 1930 cancer death rate, this represents an incidence rate of at least 126 per 100,000 population.

The cases originating in 1937 differ somewhat in distribution from all cases reported. There are relatively more of them in the sites with higher fatality and the median age is lower than for all cases reported.

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Appendix

The appendix tables give the actual numbers on which the percentages of many of the tables in the body of the table are based. The tables are numbered to correspond with the related table in the paper.

TABLE 2.—*Number of cases of cancer reported by various reporting sources, and number of sources, by sex and color, Wayne County, Mich., 1937*

Reported by	Actual number of cases								
	All cases combined	Both sexes		All colors		White		Colored	
		White	Colored	Male	Female	Male	Female	Male	Female
Nature of source									
Doctor(s) only	1,616	1,592	24	570	1,046	565	1,027	5	19
One doctor	*1,536*	*1,514*	*22*	*544*	*992*	*539*	*975*	*5*	*17*
Hospital(s) only	3,432	3,245	187	1,394	2,038	1,338	1,907	56	131
One hospital	*3,160*	*3,000*	*160*	*1,290*	*1,870*	*1,239*	*1,761*	*51*	*109*
Doctor and hospital	785	762	23	259	526	255	507	4	19
All sources	5,833	5,599	234	2,223	3,610	2,158	3,441	65	169
Number of sources									
One source only	4,696	4,514	182	1,834	2,862	1,778	2,736	56	126
Two sources only	925	887	38	316	609	310	577	6	32
Three or more sources	212	198	14	73	139	70	128	3	11
All sources	5,833	5,599	234	2,223	3,610	2,158	3,441	65	169

TABLE 3.—*Number of reported cases of cancer by primary site and reporting agency, with numbers of unduplicated cases reported, Wayne County, Mich., 1937*

Primary site	All reports		Reports by doctors only		Reports by hospitals only		Reports by doctors and hospitals
	Total	Unduplicated	Total	Unduplicated	Total	Unduplicated	Total
Buccal cavity	357	302	88	82	237	220	32
Digestive tract	1,399	1,150	444	430	773	720	182
Respiratory system	242	195	51	49	151	146	40
Genitourinary system	1,774	1,359	452	423	1,055	936	267
Breast	1,035	781	273	254	572	527	190
Skin	489	447	148	144	319	303	22
Brain	68	64	31	31	34	33	3
Bones	95	79	24	24	61	55	10
All others	374	320	107	100	231	220	36
All sites	5,833	4,697	1,618	1,537	3,433	3,160	782

TABLE 4.—*Number of sources reporting specified numbers of cancer cases, by source reporting, with actual number of cases reported, Wayne County, Mich., 1937*

Number of cases reported by each source	All sources		Doctors		Hospitals	
	Number of sources reporting	Actual number of cases reported by all sources	Number of sources reporting	Actual number of cases reported by all sources	Number of sources reporting	Actual number of cases reported by all sources
No cases	1,171	0	1,135	0	36	0
One case	410	410	404	404	6	6
Two cases	175	350	172	344	3	6
Three cases	82	246	78	234	4	12
Four cases	63	252	61	244	2	8
Five cases	35	175	32	160	3	15
Five, or less, cases	765	1,433	747	1,386	18	47
Six to ten cases	59	442	53	395	6	47
Ten, or less, cases	824	1,875	800	1,781	24	94
Eleven to twenty cases	27	358	19	245	8	113
Over twenty cases	30	5,248	9	578	21	4,670
Any number of cases	881	7,481	828	2,604	53	4,877
Total reporting	2,052	[1] 7,481	1,963	[1] 2,604	89	[1] 4,877

[1] Includes duplicated cases which were counted only once elsewhere.

TABLE 5.—*Number of cancer cases reported, and number with diagnosis microscopically confirmed, by primary site and whether reported by a hospital, Wayne County, Mich., 1937*

Primary site	Number of cases reported					
	By all sources		By doctors only		By a hospital [1]	
	Total	With microscopic	Total	With microscopic	Total	With microscopic
Buccal cavity	357	296	88	55	269	241
Digestive tract	1,399	892	444	222	955	670
Respiratory system	242	155	51	31	191	124
Genitourinary system	1,774	1,516	452	333	1,322	1,183
Breast	1,035	902	273	198	772	704
Skin	489	378	148	72	341	306
Brain	68	48	31	19	37	29
Bones	95	73	24	16	71	57
All others	374	281	107	70	267	221
All sites	5,833	4,551	1,618	1,016	4,215	3,535

[1] Both cases reported only by a hospital, and cases reported by a hospital and a doctor are included here.

TABLE 6.—*Number of reported cases of cancer, by sex, color, and primary site, Wayne County, Mich., 1937*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity, pharynx	290	67	289	64	1	3
Lip	*155*	*10*	*154*	*10*	*1*	
Tongue	*43*	*9*	*43*	*9*		
Mouth	*21*	*7*	*21*	*7*		
Jaw	*14*	*7*	*14*	*7*		
Pharynx	*12*	*2*	*12*	*2*		
Others	*45*	*32*	*45*	*29*		*3*
Digestive tract	796	603	764	580	32	23
Esophagus	*40*	*16*	*38*	*15*	*2*	*1*
Stomach, duodenum	*327*	*156*	*314*	*151*	*13*	*5*
Intestines	*168*	*177*	*164*	*168*	*4*	*9*
Rectum, anus	*164*	*145*	*158*	*140*	*7*	*5*
Liver, biliary passage	*42*	*61*	*40*	*64*	*2*	*2*
Pancreas	*41*	*37*	*37*	*34*	*5*	*1*
Mesentery, peritoneum	*14*	*8*	*14*	*8*		
Respiratory system	195	47	186	46	9	1
Larynx	*45*	*10*	*43*	*10*	*2*	
Lungs, pleura	*145*	*32*	*139*	*31*	*6*	*1*
Others	*5*	*5*	*4*	*5*	*1*	
Genitourinary system	391	1,383	382	1,294	9	89
Uterus		*1,101*		*1,025*		*76*
Kidneys	*51*	*24*	*50*	*24*	*1*	
Bladder	*98*	*56*	*98*	*56*		
Prostate	*194*		*187*		*7*	
Others	*48*	*202*	*47*	*189*	*1*	*13*
Breast	3	1,032	3	991		41
Skin	272	217	266	212	6	5
Brain	47	21	47	21		
Bones (except jaw)	59	36	54	35	5	1
All others	170	204	167	198	3	6
Total	2,223	3,610	2,158	3,441	65	169

TABLE 7.—*Number of reported cases of cancer, by age, sex, color, and residence, Wayne County, Mich., 1937*

Age group	Total				Residents				Nonresidents[1]	
	All cases		White only		White		Colored			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Under 5	4	2	4	2	4	1				1
5–9	13	3	13	3	9	2			4	1
10–14	11	7	10	6	10	6	1	1		
15–19	13	8	13	8	13	8				
20–24	15	22	14	7	14	14	1	5		3
25–29	27	51	27	46	26	41		5	1	5
30–34	45	132	40	122	34	115	5	9	6	8
35–39	71	261	63	237	57	225	8	24	6	12
40–44	152	385	147	353	127	327	5	32	20	26
45–49	222	541	215	515	196	476	7	26	19	39
50–54	286	473	280	454	262	416	6	19	18	38
55–59	291	461	281	446	261	409	10	15	20	37
60–64	299	379	296	366	268	332	3	13	28	34
65–69	280	313	271	310	251	276	9	3	20	34
70–74	230	218	225	211	213	192	5	7	12	19
75–79	135	157	134	152	120	141	1	5	14	11
80–84	64	89	63	80	58	75	1		5	5
85–89	19	15	17	14	14	13	2	1	3	1
90–94	6	3	6	3	6	2				1
95 and over		1		1		1				
Unknown	40	98	39	95	38	87	1	3	1	8
Total	2,223	3,610	2,158	3,441	1,981	3,159	65	168	177	283

[1] All white except one case, a colored female aged 30–34, included here.

TABLE 8.—*Number of cancer cases reported, by primary site and age, males only, Wayne County, Mich., 1937*

	Number of cases in each age group									Total
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	Unknown	
Buccal cavity	----	----	11	21	70	93	54	36	5	290
Lip	----	----	*7*	*8*	*42*	*41*	*34*	*19*	*4*	*155*
Others	----	----	*4*	*13*	*28*	*52*	*20*	*17*	*1*	*135*
Digestive tract	1	6	19	89	179	232	187	67	16	796
Stomach	----	*1*	*3*	*37*	*75*	*100*	*80*	*25*	*6*	*327*
Intestines	----	*1*	----	*23*	*33*	*43*	*45*	*18*	*5*	*168*
Rectum	----	*2*	*8*	*15*	*50*	*46*	*28*	*12*	*3*	*164*
Others	*1*	*2*	*8*	*14*	*21*	*43*	*34*	*12*	*2*	*137*
Respiratory system	----	4	4	24	62	54	34	11	2	195
Lungs	----	*4*	*4*	*20*	*49*	*41*	*19*	*6*	*2*	*145*
Others	----	----	----	*4*	*13*	*13*	*15*	*5*	----	*50*
Genitourinary system	5	2	12	23	68	95	122	59	5	391
Prostate	----	----	----	*7*	*18*	*42*	*87*	*37*	*3*	*194*
Others	*5*	*2*	*12*	*16*	*50*	*53*	*35*	*22*	*2*	*197*
Breast	----	----	----	----	1	----	2	----	----	3
Skin	4	1	3	25	60	61	70	42	6	272
Brain	10	1	8	10	10	5	1	----	2	47
Bones	3	10	7	8	14	6	9	1	1	59
All others	5	4	8	23	43	45	31	8	3	170
All sites	28	28	72	223	507	591	510	224	40	2,223

TABLE 9.—*Number of cancer cases reported, by primary site and age, females only, Wayne County, Mich., 1937*

Primary site	Number of cases in each age group									Total
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	Unknown	
Buccal cavity	1	2	5	12	12	11	13	8	3	67
Lip	*1*	----	*2*	----	*2*	*1*	*2*	*2*	----	*10*
Others	----	*2*	*3*	*12*	*10*	*10*	*11*	*6*	*3*	*57*
Digestive tract	----	3	23	68	136	155	120	79	19	603
Stomach	----	*1*	*5*	*13*	*28*	*47*	*33*	*26*	*3*	*156*
Intestines	----	*1*	*10*	*31*	*40*	*38*	*29*	*24*	*4*	*177*
Rectum	----	*1*	*8*	*15*	*40*	*36*	*23*	*14*	*8*	*145*
Others	----	----	----	*9*	*28*	*34*	*35*	*15*	*4*	*125*
Respiratory system	----	2	4	4	19	13	4	----	1	47
Lungs	----	*1*	*4*	*3*	*13*	*9*	*1*	----	*1*	*32*
Others	----	*1*	----	*1*	*6*	*4*	*3*	----	----	*15*
Genitourinary system	3	6	73	310	420	320	175	53	23	1,383
Uterus	----	*2*	*51*	*249*	*348*	*268*	*120*	*42*	*21*	*1,101*
Others	*3*	*4*	*22*	*61*	*72*	*52*	*55*	*11*	*2*	*282*
Breast	----	3	45	182	338	236	139	62	27	1,032
Skin	1	2	7	27	35	47	43	44	11	217
Brain	1	----	3	5	6	3	1	----	2	21
Bones	----	3	4	11	4	11	3	----	----	36
All others	6	9	19	27	52	35	35	9	12	204
All sites	12	30	183	646	1,022	831	533	255	98	3,610

TABLE 12.—*Number of recorded cancer deaths with corresponding number of reported cases, by color, sex, and primary site, Wayne County, Mich., 1937*

Primary site	White				Total			
	Male		Female		Male		Female	
	Deaths[1]	Cases	Deaths[1]	Cases	Deaths	Cases	Deaths	Cases
Buccal cavity, pharynx	44	264	10	40	45	265	10	40
Lip	6	154	2	10	6	155	2	10
Tongue	11	43	2	9	11	43	2	9
Mouth	9	21	1	7	9	21	1	7
Jaw	7	14	3	7	7	14	3	7
Pharynx	4	12	2	2	5	12	2	2
Other buccal	7	20		5	7	20		5
Digestive tract	433	764	347	580	457	796	364	603
Esophagus	29	38	8	15	32	40	10	16
Stomach, duodenum	206	314	118	151	213	327	125	156
Intestines	68	164	89	168	72	168	91	177
Rectum, anus	56	158	47	140	60	164	51	145
Liver, biliary passage	37	40	55	64	38	42	57	66
Pancreas	33	36	24	34	38	41	24	35
Other digestive	4	14	6	8	4	14	6	8
Respiratory system	104	186	24	46	110	195	24	47
Larynx	18	43	2	10	20	45	2	10
Lungs, pleura	65	113	16	26	68	119	16	27
Other	21	30	6	10	22	31	6	10
Genitourinary system	119	382	273	1,290	123	391	306	1,379
Uterus			202	1,025			231	1,101
Kidneys	21	50	6	24	21	51	6	24
Bladder	33	98	20	56	33	98	20	56
Prostate	59	187			63	194		
Other genital	4	29	45	185	4	29	49	198
Other urinary	2	18			2	19		
Breast	3	3	147	991	4	3	158	1,032
Skin	10	266	2	212	10	272	2	217
Brain	8	47	6	21	8	47	7	21
Bones	12	54	5	35	12	59	5	36
All others	50	192	64	226	53	195	66	235
Total	783	2,158	878	3,441	822	2,223	942	3,610

[1] All cancer death certificates are included here irrespective of whether or not there was a case reported for the death certificate.

TABLE 13.—*Number of reported cases of cancer by months since first diagnosed, color, and vital status, Wayne County, Mich., 1937*

Months since first diagnosis	Vital status						Total		All cases
	Alive		Dead		Unknown		White	Colored	
	White	Colored	White	Colored	White	Colored			
Under 6	755	33	1,019	62	311	9	2,085	104	2,189
6–11	666	22	302	23	129	4	1,097	49	1,146
12–17	303	7	144	8	41	3	488	18	506
18–23	216	7	89	3	21	1	326	11	337
24–29	132	2	67	3	28		227	5	232
30–35	124	2	34	4	13	1	171	7	178
36–41	113	4	38	1	12		163	5	168
42–47	87	5	19	1	13		119	6	125
48–53	62	1	18		10		90	1	91
54–59	67	1	17	2	3	1	87	4	91
60–65	54	4	2		9		65	4	69
66–71	55	2	5		2		62	2	64
72–77	34		8	1	4		46	1	47
78–83	65	2	4		1		70	2	72
84–89	58	1	4		2		64	1	65
90–95	70	3	2				72	3	75
96 and over	312	11	18		9		339	11	350
Unknown	10		8		10		28		28
Total	3,183	107	1,798	108	618	19	5,599	234	5,833

TABLE 14.—*Number of reported living cases of cancer, by months since first diagnosis, and primary site, Wayne County, Mich., 1937*

Primary site	Months since first diagnosis									
	Under 6	6–11	12–17	18–23	24–29	30–35	36–41	42–47	48–53	54–59
Buccal cavity, pharynx	39	52	24	13	11	7	10	6	5	8
Lip	15	24	13	9	7	5	8	5	3	5
Tongue	11	7	3	1		2			1	1
Mouth	4	7		1	1					
Jaw	3	3					1			
Pharynx	1							1		
Others	5	11	8	2	3		1		1	2
Digestive tract	180	105	43	33	17	15	13	13	5	9
Esophagus	5	2								
Stomach, duodenum	62	27	8	7	5	4	1	3		2
Intestines	47	30	19	14	1	4	6	3	1	3
Rectum, anus	43	40	14	12	11	6	5	6	4	3
Liver, biliary passage	12	2	1				1	1		1
Pancreas	6	3	1			1				
Mesentery, peritoneum	5	1								
Respiratory system	31	11	9	6	2		1	2	2	1
Larynx	7	1	3	5			1		1	1
Lungs, pleura	23	10	5	1				2		
Others	1		1		2				1	
Genitourinary system	239	231	101	78	47	40	47	35	23	27
Uterus	126	151	67	56	30	29	34	27	16	17
Kidneys	10	15	3	2	3					
Bladder	29	11	11	8	2	5	4	2	2	2
Prostate	40	19	10	6	4		3	1	3	3
Others	34	35	10	6	8	6	6	5	2	5
Breast	121	145	61	46	23	30	19	20	16	12
Skin	87	75	41	28	18	22	20	7	7	7
Brain	12	7	6	3	5	4				
Bones	18	13	4	5	3	1	1	5	1	1
All others	61	49	21	11	8	7	6	4	4	3
Total	788	688	310	223	134	126	117	92	63	68

Primary site	Months since first diagnosis—Continued								
	60–65	66–71	72–77	78–83	84–89	90–95	96+	Unknown	Total
Buccal cavity, pharynx	7	5	2	9	4	4	32	1	239
Lip	3	5		4	4	1	10	1	122
Tongue				2			3		31
Mouth				2			3		18
Jaw	1		1				2		11
Pharynx							1		3
Others	3		1	1		3	13		54
Digestive tract	3	3	2	6	7	7	14	2	477
Esophagus									7
Stomach, duodenum				2	3	4	2	1	131
Intestines	2			1	1	1	6		139
Rectum, anus	1	3	2	3	2	2	5	1	163
Liver, biliary passage							1		19
Pancreas									11
Mesentery, peritoneum					1				7
Respiratory system	1						4		70
Larynx							3		22
Lungs, pleura	1						1		43
Others									5
Genitourinary system	19	19	14	25	18	32	105	4	1,104
Uterus	15	15	11	18	15	24	86	4	741
Kidneys			1						34
Bladder	1	2			1	1	6		87
Prostate				1		1			91
Others	3	2	2	6	2	6	13		151
Breast	13	13	9	15	18	18	102	2	683
Skin	9	10	3	3	8	7	43	1	396
Brain							1		38
Bones		1	1	2		1	4		61
All others	6	6	3	7	4	4	18		222
Total	58	57	34	67	59	73	323	10	3,290

TABLE 15.—*Number of reported dead cases of cancer, by months since first diagnosis, and primary site, Wayne County, Mich., 1937*

Primary site	Months since first diagnosis												
	Under 6	6–11	12–17	18–23	24–29	30–35	36–41	42–47	48–53	54–59	60 and over	Unknown	Total
Buccal cavity, pharynx	28	18	16	1	2	1	1	1	2	2	2	1	75
Lip	5	2	3	----	1	1	----	----	2	1	2	----	17
Tongue	8	5	5	----	----	----	----	----	----	1	----	----	19
Mouth	3	3	1	----	1	----	----	1	----	----	----	----	9
Jaw	2	3	2	----	----	----	1	----	----	----	----	----	8
Pharynx	6	2	1	----	----	----	----	----	----	----	----	1	10
Others	4	3	4	1	----	----	----	----	----	----	----	----	12
Digestive tract	565	116	39	19	18	6	8	3	2	5	7	4	792
Esophagus	35	7	----	----	----	----	1	----	----	----	1	----	44
Stomach, duodenum	228	50	9	4	6	2	3	----	1	3	1	2	309
Intestines	126	27	10	3	6	----	2	----	1	2	----	----	177
Rectum, anus	52	23	15	7	5	3	2	3	----	----	4	1	115
Liver, biliary passage	68	5	5	4	----	----	----	----	----	----	1	1	84
Pancreas	51	4	----	----	1	1	----	----	----	----	----	----	57
Mesentery, peritoneum	5	----	----	1	----	----	----	----	----	----	----	----	6
Respiratory system	94	28	6	11	2	1	----	1	----	----	1	----	144
Larynx	11	4	3	4	----	1	----	----	----	----	1	----	24
Lungs, pleura	79	24	3	7	1	----	----	1	----	----	----	----	115
Others	4	----	----	----	1	----	----	----	----	----	----	----	5
Genitourinary system	226	90	49	29	22	14	15	6	6	6	14	1	478
Uterus	101	46	27	15	14	10	6	4	4	5	9	1	242
Kidneys	20	9	1	2	----	1	2	----	----	----	2	----	37
Bladder	34	9	4	1	----	----	----	----	----	----	1	----	49
Prostate	42	12	8	5	3	----	6	1	1	----	----	----	78
Others	29	14	9	6	5	3	1	1	1	1	2	----	72
Breast	65	39	23	22	20	12	12	7	3	5	11	----	219
Skin	10	7	4	2	2	2	1	----	3	----	5	----	36
Brain	15	6	4	2	----	----	----	----	----	----	1	----	28
Bones	11	7	2	----	1	1	2	----	----	----	1	2	25
All others	67	15	10	5	3	1	----	2	2	----	2	2	109
All sites combined	1,081	326	153	91	70	38	39	20	18	18	44	8	1,906

TABLE 16.—*Number of cancer cases under observation only during study year, by months since last treated, sex, and color, and by reporting source, Wayne County, Mich., 1937*

Months since last treated	Number of cases under observation only							Number of cases reported by—		
	Total	All		White		Colored		Doctors only	Hospitals only	Doctor and hospital
		Male	Female	Male	Female	Male	Female			
Under 6	189	72	117	69	109	3	8	54	130	5
6–11	125	48	77	47	73	1	4	34	89	2
12–17	86	32	54	32	52	----	2	19	64	3
18–23	90	26	64	26	62	----	2	12	76	2
24–29	73	17	56	16	54	1	2	13	60	----
30–35	47	15	32	15	30	----	2	4	43	----
36–41	38	14	24	14	24	----	----	10	28	----
42–47	31	12	19	12	17	----	2	5	26	----
48–53	37	12	25	12	24	----	1	5	32	----
54–59	38	10	28	10	26	----	2	4	34	----
60–65	31	6	25	6	25	----	----	3	26	2
66–71	54	20	34	20	32	----	2	3	51	----
72–77	43	10	33	9	31	1	2	2	41	----
78–83	45	6	39	6	36	----	3	----	43	2
84–89	37	7	30	7	29	----	1	----	37	----
90–95	21	3	18	3	18	----	----	----	21	----
96 and over	118	16	102	16	99	----	3	4	113	1
Unknown	94	31	63	31	60	----	3	88	6	----
Total	1,197	357	840	351	801	6	39	260	920	17

TABLE 17.—*Number of cancer cases under observation only during the study year, by months since last treated and by age groups, Wayne County, Mich., 1937*

Months since last treated	Age, in years									All ages
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	Unknown	
Under 6	4		8	33	57	49	28	8	2	189
6–11		1	7	28	33	24	18	12	2	125
12–17	1	2	2	17	23	18	19	4		86
18–23		1	2	20	26	20	12	8	1	90
24–29	1	1	2	13	26	16	7	6	1	73
30–35	1	1	2	10	15	9	7	1	1	47
36–41		1	2	2	13	7	9	2	2	38
42–47			1	6	10	4	6	4		31
48–53			3	8	12	9	4	1		37
54–59			2	7	11	9	6	3		38
60–65	2			3	10	12	3	1		31
66–71		2	3	8	13	7	15	6		54
72–77		1	1	7	11	13	10			43
78–83		1	6	4	9	18	4	3		45
84–89				6	14	6	8	3		37
90–95	1			3	2	5	7	3		21
96 and over		1	2	17	25	35	29	9		118
Unknown			3	9	21	11	17	10	23	94
Total	10	12	46	201	331	272	209	84	32	1,197

TABLE 19.—*Number of cancer cases that were under observation only during the study year, by months since last treated, and primary site with the number of cases treated, Wayne County, Mich., 1937*

Months since last treated	Primary site									All sites combined
	Buccal cavity	Digestive tract	Respiratory	Genito-urinary	Breast	Skin	Brain	Bones	All other sites	
Under 6	19	21	7	57	36	26	8	1	14	189
6–11	6	17	2	44	21	25	2	4	4	125
12–17	6	8	1	29	19	13	2		8	86
18–23	7	10	1	30	18	19	1		4	90
24–29	8	5	2	29	17	9			3	73
30–35	4	5		14	10	7		3	4	47
36–41	6	3		14	8	3		1	3	38
42–47	6	3	1	11	3	5		1	1	31
48–53	5	1		10	8	6			7	37
54–59	5	2		13	6	6			6	38
60–65	3	1		13	10	1		2	1	31
66–71	5	8	1	22	11	3			4	54
72–77	1	5		19	10	2			6	43
78–83	2	2		25	11	4			1	45
84–89	1	1		14	13	4		1	3	37
90–95		1		9	7	3			1	21
96 and over	16	4	1	40	38	15		1	3	118
Unknown	4	31		32	16	4			7	94
Total	104	128	16	425	262	155	13	14	80	1,197
Number treated in 1937	253	1,271	226	1,349	773	334	55	81	294	4,636
Total number of cases	357	1,399	242	1,774	1,035	489	68	95	374	5,833

TABLE 21.—*Number of cancer cases first seen in 1937, by primary site, sex, color, and residence, Wayne County, Mich., 1937*

Primary site	Number of cases first seen in 1937							
	Total		White				Colored[1]	
			Resident		Nonresident			
	Male	Female	Male	Female	Male	Female	Male	Female
Buccal cavity	118	22	113	22	5			
Digestive tract	556	405	482	359	47	28	27	18
Respiratory	135	25	122	24	6	1	7	
Genitourinary	225	593	197	497	23	56	5	40
Breast		429		373		34		22
Skin	111	89	100	80	9	6	2	3
Brain	27	13	20	10	7	3		
Bones	29	17	23	14	2	3	4	
All other sites	94	115	81	98	11	13	2	4
All sites	1,295	1,708	1,138	1,477	110	144	47	87

[1] All colored cases are resident except one female, primary site genitourinary.

TABLE 22.—*Number of cancer cases first seen in 1937, by sex, color, age distribution, and residence, Wayne County, Mich.*

Age group	Number of cases first seen in 1937							
	Total		White		Colored[1]		White residents	
	Male	Female	Male	Female	Male	Female	Male	Female
Under 5	3	1	3	1			3	
5–9	6	1	6	1			4	1
10–14	7	5	6	4	1	1	6	4
15–19	7	3	7	3			7	3
20–24	9	12	8	9	1	3	8	8
25–29	12	28	12	25		3	11	22
30–34	29	77	25	69	4	8	20	66
35–39	37	120	30	107	7	13	25	98
40–44	93	188	90	173	3	15	79	159
45–49	130	241	125	233	5	8	112	209
50–54	168	217	164	206	4	11	153	187
55–59	177	197	167	187	8	10	157	172
60–64	173	187	171	184	2	3	153	168
65–69	162	140	154	138	8	2	140	126
70–74	131	105	129	101	2	4	122	89
75–79	86	88	85	85	1	3	77	78
80–84	30	34	30	34			27	33
85–89	10	5	9	5	1		9	4
90–94	4		4				4	
95 and over								
Unknown	21	59	21	56		3	21	50
All ages	1,295	1,708	1,248	1,621	47	87	1,138	1,477

[1] All colored cases are resident except one female, aged 30–34.

TABLE 23.—*Number of cases first seen in 1937 by primary site and age, males only, Wayne County, Mich.*

Primary site	Number of cases in each age group									All ages
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	Unknown	
Buccal cavity			8	9	34	27	21	17	2	118
Lip			*5*	*2*	*17*	*8*	*12*	*7*	*1*	*52*
Others			*3*	*7*	*17*	*19*	*9*	*10*	*1*	*66*
Digestive tract	1	4	12	60	120	174	128	52	5	556
Stomach			*2*	*29*	*53*	*89*	*58*	*18*	*1*	*241*
Intestines		*1*		*14*	*24*	*30*	*28*	*15*	*1*	*113*
Rectum		*2*	*4*	*7*	*25*	*29*	*13*	*7*	*2*	*89*
Others	*1*	*1*	*6*	*10*	*18*	*25*	*29*	*12*	*1*	*113*
Respiratory system		3	2	19	47	34	21	7	2	135
Lungs		*3*	*2*	*16*	*38*	*30*	*12*	*5*	*2*	*108*
Others				*3*	*9*	*4*	*9*	*2*		*27*
Genitourinary system	2	1	8	14	41	58	67	29	5	225
Prostate				*5*	*14*	*27*	*51*	*18*	*3*	*118*
Others	*2*	*1*	*8*	*9*	*27*	*31*	*16*	*11*	*2*	*107*
Skin	2		1	11	22	26	29	18	2	111
Brain	6		4	6	3	5	1		2	27
Bones	2	6	3	1	7	3	5	1	1	29
All others	3	2	3	10	24	23	21	6	2	94
All sites	16	16	41	130	298	350	293	130	21	1,295

TABLE 24.—*Number of cases first seen in 1937, by primary site and age, females only, Wayne County, Mich.*

Primary site	Number of cases in each age group									All ages
	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	Unknown	
Buccal cavity		1	3	3	4	4	2	2	3	22
Digestive tract		2	16	43	85	111	81	54	13	405
Stomach		*1*	*4*	*9*	*23*	*37*	*25*	*20*	*1*	*120*
Intestines		*1*	*7*	*20*	*21*	*28*	*18*	*16*	*1*	*112*
Rectum			*5*	*6*	*20*	*20*	*11*	*5*	*7*	*74*
Others				*8*	*21*	*26*	*27*	*12*	*4*	*99*
Respiratory system			1	3	11	6	3		1	25
Genitourinary system	2	4	36	136	173	124	79	27	12	593
Uterus		*1*	*26*	*108*	*139*	*100*	*43*	*18*	*10*	*445*
Others	*2*	*3*	*10*	*28*	*34*	*24*	*36*	*9*	*2*	*148*
Breast		2	30	89	139	90	49	18	12	429
Skin	1	1	3	12	11	20	14	19	8	89
Brain	1		1	4	2	3			2	13
Bones		1	2	7	1	6				17
All others	3	4	13	11	32	20	17	7	8	115
All sites	7	15	105	308	458	384	245	127	59	1,708

TABLE 25.—*Number of recorded deaths from cancer which were not reported as a case, by sex, color, and primary site, Wayne County, Mich., 1937*

Primary site	Number of deaths			
	White		Total	
	Male	Female	Male	Female
Buccal cavity, pharynx	4		5	
Lip				
Tongue	1		1	
Mouth	1		1	
Jaw	1		2	
Pharynx	1		2	
Other buccal	1		1	
Digestive tract	54	45	59	45
Esophagus	4		5	
Stomach, duodenum	31	17	32	17
Intestines	5	11	6	11
Rectum, anus	3	4	3	4
Liver, biliary passage	5	10	6	10
Pancreas	5	1	6	1
Other digestive	1	2	1	2
Respiratory system	14	1	14	1
Larynx	2		2	
Lungs, pleura	10	1	10	1
Other	2		2	
Genitourinary system	7	38	7	42
Uterus		25		29
Kidneys		4		4
Bladder	3	2	3	2
Prostate	4		4	
Other genital		7		7
Other urinary				
Breast	1	16	1	16
Skin	1		1	
Brain	1	2	1	3
Bones	1		1	
All others	8	13	8	13
Total	91	115	97	120

TABLE 26.—*Number of recorded deaths from cancer which were not reported as a case, by age, sex, and color, Wayne County, Mich., 1937*

Age group	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Under 5						
5-9	1	1	1	1		
10-14	1		1			
15-19	1	1	1			1
20-24						
25-29	2	1	2	1		
30-34	2	2		2	2	
35-39	2	4	2	3		1
40-44	4	8	3	8	1	
45-49	7	17	6	17	1	
50-54	7	17	7	16		1
55-59	12	16	12	14		2
60-64	20	10	20	10		
65-69	11	13	10	13	1	
70-74	14	14	13	14	1	
75-79	8	7	8	7		
80-84	4	7	4	7		
85-89						
90-94	1	1	1	1		
95 and over						
Unknown		1		1		
All ages	97	120	91	115	6	5

DR. C. S. HUDSON GIVEN BORDEN COMPANY AWARD

At the annual meeting of the American Chemical Society, to be held in St. Louis from April 7 to 11, the annual Borden Co. Award for research on chemistry of milk is to be presented to Dr. C. S. Hudson, Chief of the Chemistry Division of the National Institute of Health. Dr. Hudson, who is known for his contributions in the field of sugar chemistry, will deliver an address on "Milk Sugar" on April 10.

COURT DECISION ON PUBLIC HEALTH

Regulation of city board of health regarding issuance of permits to independent milk distributors upheld.—(New York Court of Appeals; *In the Matter of the Application of John Stracquadanio;* decided March 6, 1941.) The board of health of New York City, in the performance of its statutory duty to protect and promote public health within the city, was authorized to promulgate regulations as a means to accomplish that end and, by appropriate sanitary code provisions, to exercise control and supervision over the delivery of milk and milk products to consumers. Under the sanitary code three classes of permits for the distribution of milk were issued, as follows: Class A, to dealers operating pasteurizing plants in the city; class B, to dealers operating milk depots; and class C, to dealers operating not more than one vehicle in the delivery of milk or milk products and not maintaining a pasteurizing plant or milk depot but utilizing the facilities of such a plant or depot located in the city and operated under a board of health permit. On July 27, 1939, the board of health, under charter authority, promulgated the following regulation defining the conditions under which a class C permit could be issued: "The applicant must be a person of good character, of sufficient experience in the milk industry, and have been a bona fide independent individual milk distributor in this city prior to June 1, 1939."

The petitioner sought a class C permit to deliver milk as an independent distributor but such a permit was denied him by the board of health. Concededly he was not an independent milk distributor prior to June 1, 1939. A proceeding was then instituted by the petitioner to secure a mandatory order directing the board of health to issue to him the desired permit. He asserted that the involved regulation contravened the equal protection clauses of the Federal and State Constitutions and that refusal by the board to issue a permit was capricious, arbitrary, and in violation of the said constitutional provisions. The New York Court of Appeals, however, did not agree with the petitioner's contention and affirmed the denial by the lower courts of the petitioner's application for a mandatory order. The

challenged regulation was deemed by the court to be a valid exercise of the board of health's authority because bearing a reasonable relation to a bona fide purpose by the board to safeguard the milk supply of the city as an incident to the protection and promotion of public health.

DEATHS DURING WEEK ENDED MARCH 22, 1941

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 22, 1941	Corresponding week, 1940
Data from 88 large cities of the United States:		
Total deaths	9,041	8,994
Average for 3 prior years	9,062	
Total deaths, first 12 weeks of year	114,896	114,002
Deaths under 1 year of age	536	464
Average for 3 prior years	523	
Deaths under 1 year of age, first 12 weeks of year	6,559	6,198
Data from industrial insurance companies:		
Policies in force	64,594,526	65,940,665
Number of death claims	13,208	12,988
Death claims per 1,000 policies in force, annual rate	10.7	10.3
Death claims per 1,000 policies, first 12 weeks of year, annual rate	10.8	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 29, 1941

Summary

With the single exception of poliomyelitis, increased incidence was recorded for the current week for each of the 9 communicable diseases reported weekly by the State health officers and included in the following table.

Measles, with 55,795 cases reported as compared with 47,421 for the preceding week, still dominates the picture so far as these diseases are concerned. For the second week the number of cases exceeds the peak week of 1938 (44,191 for the week of March 26). An increase was shown for all geographic areas except the West North Central, West South Central, and Pacific States. The highest incidence rates are still reported from the East North Central and Middle Atlantic groups, while the Pacific States recorded the lowest. The largest numbers of reported cases occurred in New York (8,831), Ohio (7,818), Michigan (5,896), and Pennsylvania (5,659).

Of the other 8 diseases included in the table, only influenza and whooping cough were above the 5-year (1936–40) median expectancy. Ten of 54 cases of meningococcus meningitis were reported in Pennsylvania; and of these, 5 occurred in Luzerne County, where a considerable number of cases were reported last year.

Three cases of Rocky Mountain spotted fever were reported in Oregon and 1 case was reported in Montana. Three cases of tularemia were reported in North Carolina and 1 case each in South Carolina and Kentucky. Of 18 cases of endemic typhus fever, 8 cases occurred in Texas.

The death rate for the current week for 93 major cities in the United States was 12.3 per 1,000 population, as compared with 12.6 for the preceding week and with 12.5 for the 3-year (1938–40) average (88 cities) for the corresponding week. The annual rate for the first 13 weeks of the year is 13.7, the same as for the corresponding period of last year.

Telegraphic morbidity reports from State health officers for the week ended March 29, 1941, and comparison with corresponding week of 1940 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40	Week ended—		Median 1936–40
	Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940	
NEW ENG.												
Maine	1	7	1	1	4	8	41	424	164	0	0	0
New Hampshire	0	0	0	----	----	----	83	144	46	0	0	0
Vermont	0	0	0	----	----	----	27	9	43	0	0	0
Massachusetts	2	2	3	----	----	----	787	359	632	3	1	2
Rhode Island	0	0	0	2	----	----	5	158	120	0	0	1
Connecticut	1	0	2	8	6	7	126	134	134	1	0	1
MID. ATL.												
New York	22	16	24	[1] 28	[1] 15	[1] 22	8,831	560	1,467	4	2	8
New Jersey	11	10	10	15	16	16	3,244	461	461	1	0	1
Pennsylvania	9	25	38	----	----	----	5,659	215	595	10	7	7
E. NO. CEN.												
Ohio	7	3	30	16	97	20	7,818	25	411	2	2	7
Indiana	19	6	10	33	27	55	1,095	10	10	1	3	3
Illinois	34	19	35	94	33	52	4,497	82	82	0	2	2
Michigan [2]	11	3	12	28	3	3	5,896	318	318	1	0	2
Wisconsin	0	0	1	324	202	74	1,447	292	292	0	0	1
W. NO. CEN.												
Minnesota	1	2	3	7	3	2	12	214	214	0	0	0
Iowa	6	2	6	71	9	9	270	341	160	0	0	1
Missouri	3	2	11	9	1	62	146	7	24	0	0	0
North Dakota	5	1	1	----	6	6	1	1	3	0	0	0
South Dakota*	0	2	0	1	1	----	3	1	2	0	0	0
Nebraska	5	3	3	----	----	----	3	58	64	0	0	0
Kansas	8	0	4	13	4	8	1,133	580	37	1	1	1
SO. ATL.												
Delaware	0	0	0	----	----	----	337	0	15	0	0	0
Maryland [2]	4	2	5	176	41	41	393	4	204	0	1	2
Dist. of Col.	2	3	5	2	3	2	276	0	46	0	1	1
Virginia	14	6	16	441	484	484	2,547	203	217	5	1	1
West Virginia [2]	8	5	9	49	138	138	552	17	18	1	2	4
North Carolina	12	22	16	59	57	57	1,600	145	168	3	1	1
South Carolina [2]	5	3	5	713	455	533	598	3	38	0	1	1
Georgia [2]	2	8	8	201	90	336	692	155	155	1	1	2
Florida [2]	6	8	4	165	13	25	1,337	193	186	3	2	2
E. SO. CEN.												
Kentucky	6	6	8	26	64	64	1,280	71	105	5	2	9
Tennessee	11	2	6	220	153	153	712	66	66	0	3	3
Alabama [2]	4	10	5	883	231	674	829	130	130	4	3	3
Mississippi [2]	3	12	4	----	----	----	----	----	----	2	0	1
W. SO. CEN.												
Arkansas	13	6	6	195	254	254	352	12	15	1	1	1
Louisiana	3	7	11	8	31	31	69	32	90	1	0	1
Oklahoma	2	7	7	201	197	197	44	7	26	1	1	1
Texas [2]	40	26	26	2,598	1,154	1,154	1,250	789	440	1	1	3
MOUNTAIN												
Montana [4]	0	1	1	10	43	26	44	35	22	0	0	0
Idaho	0	2	1	----	----	11	17	39	18	0	0	1
Wyoming	1	1	2	----	----	1	126	37	28	0	0	0
Colorado	10	5	7	48	11	----	363	27	27	0	0	0
New Mexico	3	0	2	----	1	19	342	53	87	0	0	0
Arizona	2	5	2	96	137	137	109	104	104	0	0	0
Utah [2]	1	0	0	18	13	----	31	417	150	0	0	0
Nevada	0	----	----	----	----	----	11	----	----	0	----	----
PACIFIC												
Washington	3	1	1	13	----	----	40	891	293	1	0	0
Oregon [4]	3	9	2	22	28	39	361	620	58	1	1	1
California	12	14	22	253	62	417	359	444	686	0	2	3
Total*	315	274	414	7,047	4,087	4,770	55,795	8,887	13,005	54	42	77
13 weeks*	3,807	4,942	6,774	569,192	149,029	113,646	325,577	76,869	104,857	624	520	1,161

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 29, 1941, and comparison with corresponding week of 1940 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40
	Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940		Mar. 29, 1941	Mar. 30, 1940	
NEW ENG.												
Maine	0	0	0	5	15	29	0	0	0	0	0	0
New Hampshire	0	0	0	1	1	7	0	0	0	1	0	0
Vermont	0	0	0	16	9	15	0	0	0	0	2	0
Massachusetts	0	0	0	166	163	287	0	0	0	0	0	0
Rhode Island	0	0	0	7	17	29	0	0	0	0	0	0
Connecticut	0	0	0	71	106	106	0	0	0	0	2	1
MID. ATL.												
New York	0	0	1	640	994	994	0	0	0	10	9	5
New Jersey	1	0	0	346	448	272	0	0	0	1	1	1
Pennsylvania	0	1	1	400	548	548	0	0	0	7	7	7
E. NO. CEN.												
Ohio	0	1	1	297	431	431	2	3	3	1	5	2
Indiana	0	0	0	190	252	241	1	5	10	1	0	1
Illinois	1	1	1	512	857	857	7	3	18	3	3	4
Michigan [2]	0	0	0	396	310	522	0	0	9	0	6	5
Wisconsin	0	0	0	156	145	186	7	3	4	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	63	80	147	3	2	13	0	1	1
Iowa	0	1	0	64	75	209	4	23	34	0	1	0
Missouri	1	0	0	40	29	182	17	2	26	1	2	0
North Dakota	0	0	0	9	5	20	0	3	5	0	3	1
South Dakota*	1	0	0	24	13	14	0	1	7	0	0	0
Nebraska	0	0	0	55	19	44	0	3	8	0	0	0
Kansas	0	0	0	61	63	138	1	0	12	2	0	0
SO. ATL.												
Delaware	0	0	0	11	10	9	0	0	0	0	0	0
Maryland [2]	1	0	0	49	38	58	0	0	0	1	2	2
Dist. of Col	0	0	0	14	16	18	0	0	0	2	0	0
Virginia	1	0	0	76	32	32	0	0	0	3	2	4
West Virginia [2]	0	1	0	42	41	44	0	0	0	3	2	4
North Carolina	2	0	0	32	33	30	1	0	0	2	2	2
South Carolina [3]	0	0	0	8	5	5	0	0	0	1	3	2
Georgia [3]	0	0	0	9	20	14	0	3	1	3	0	2
Florida [3]	2	1	1	6	8	8	0	1	0	8	2	2
E. SO. CEN.												
Kentucky	0	0	0	180	111	63	0	0	0	1	2	3
Tennessee	0	0	0	130	94	52	0	0	1	2	1	2
Alabama [3]	2	0	0	25	18	9	0	1	1	3	3	3
Mississippi [3]	2	1	1	0	7	7	0	0	0	0	2	2
W. SO. CEN.												
Arkansas	0	0	0	7	4	10	0	1	1	5	1	1
Louisiana	0	0	0	5	19	13	1	0	1	2	6	10
Oklahoma	1	0	0	18	11	24	0	3	3	1	0	2
Texas [3]	1	4	3	59	37	75	0	5	5	8	5	6
MOUNTAIN												
Montana [4]	1	1	0	34	29	27	0	0	5	0	3	1
Idaho	1	0	0	7	14	14	0	0	3	0	0	1
Wyoming	0	0	0	20	4	17	0	0	2	0	0	0
Colorado	0	0	0	24	44	44	0	7	7	0	0	0
New Mexico	0	0	0	4	22	22	0	0	0	2	3	0
Arizona	0	1	0	9	14	5	0	0	0	0	0	1
Utah [2]	0	3	0	11	12	23	0	0	0	0	0	0
Nevada	0	----	----	0	----	----	0	----	----	1	----	----
PACIFIC												
Washington	0	0	0	12	24	44	1	0	10	0	1	2
Oregon [4]	1	0	0	7	20	36	0	1	12	0	0	1
California	1	3	3	133	149	203	0	2	9	4	4	4
Total*	20	19	19	4,451	5,416	5,767	45	72	328	79	86	121
13 weeks*	352	354	277	47,221	61,523	79,381	605	954	3,982	988	1,002	1,406

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 29, 1941, and comparison with corresponding week of 1940 and 5-year median—Con.

Division and State	Whooping cough	
	Week ended—	
	Mar. 29, 1941	Mar. 30, 1940
NEW ENG.		
Maine	54	33
New Hampshire	9	10
Vermont	27	34
Massachusetts	207	150
Rhode Island	19	8
Connecticut	67	25
MID. ATL.		
New York	334	319
New Jersey	98	82
Pennsylvania	430	380
E. NO. CEN.		
Ohio	322	223
Indiana	25	41
Illinois	95	118
Michigan [2]	427	120
Wisconsin	101	97
W. NO. CEN.		
Minnesota	90	27
Iowa	49	7
Missouri	42	4
North Dakota	26	27
South Dakota*	10	2
Nebraska	50	9
Kansas	119	17
SO. ATL.		
Delaware	7	16
Maryland [2]	80	174
Dist. of Col	6	7
Virginia	99	32
West Virginia [2]	64	69
North Carolina	307	69
South Carolina [3]	159	15
Georgia [3]	27	28
Florida [3]	18	20
E. SO. CEN.		
Kentucky	82	50
Tennessee	78	36
Alabama [3]	83	33
Mississippi [3]	----	----
W. SO. CEN.		
Arkansas	17	18
Louisiana	12	25
Oklahoma	81	3
Texas [3]	269	243
MOUNTAIN		
Montana [4]	9	1
Idaho	5	25
Wyoming	0	5
Colorado	94	5
New Mexico	31	31
Arizona	40	29
Utah [2]	90	105
Nevada	0	----
PACIFIC		
Washington	79	33
Oregon [4]	9	24
California	564	258
Total*	4,911	3,092
13 weeks*	55,910	37,830

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Mar. 29, 1941, 18 cases as follows: South Carolina, 1; Georgia, 2; Florida, 3; Alabama, 3; Mississippi, 1; Texas, 8.
[4] Rocky Mountain spotted fever, week ended Mar. 29, 1941, 4 cases as follows: Montana, 1; Oregon, 3.
*Current report for South Dakota not received; figures included are those reported for the week ended March 22.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 15, 1941

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	127	691	122	5,960	857	2,309	28	393	22	1,170	----
Current week [1]	61	454	63	18,570	465	1,379	4	368	30	1,154	----
Maine:											
Portland	0	----	0	1	1	1	0	0	0	10	21
New Hampshire:											
Concord	0	----	0	0	0	0	0	1	1	0	11
Manchester	0	----	0	0	2	9	0	0	0	0	19
Nashua	0	----	0	0	0	0	0	0	0	2	10
Vermont:											
Barre	----	----	----	----	----	----	----	----	----	----	----
Burlington	0	----	0	0	0	0	0	0	0	0	11
Rutland	0	----	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	1	----	1	329	16	24	0	8	0	32	228
Fall River	0	----	0	0	2	7	0	1	0	1	30
Springfield	0	----	0	4	2	9	0	3	0	11	38
Worcester	0	----	0	82	7	9	0	1	0	8	58
Rhode Island:											
Pawtucket	0	----	0	0	0	1	0	0	0	0	----
Providence	0	----	0	2	1	2	0	1	0	16	49
Connecticut:											
Bridgeport	0	1	0	2	4	5	0	1	0	5	41
Hartford	0	----	0	1	0	2	0	1	0	1	37
New Haven	0	----	0	1	1	19	0	0	0	7	47
New York:											
Buffalo	0	1	0	83	2	36	0	8	0	12	151
New York	12	54	4	6,063	88	265	0	84	3	96	1,563
Rochester	0	----	0	38	2	3	0	0	1	14	65
Syracuse	0	----	0	1	2	2	0	1	0	10	41
New Jersey:											
Camden	0	----	0	24	2	12	0	0	0	6	35
Newark	0	14	1	350	6	61	0	5	0	13	115
Trenton	0	1	0	44	1	51	0	4	0	0	43
Pennsylvaia:											
Philadelphia	5	10	6	1,903	37	85	0	19	1	55	513
Pittsburgh	2	----	3	216	8	7	0	10	2	44	182
Reading	0	----	0	280	1	3	0	2	0	6	34
Scranton	0	----	----	3	----	1	0	----	0	0	----
Ohio:											
Cincinnati	2	3	1	244	1	16	0	6	0	5	125
Cleveland	0	22	2	2,975	10	30	0	1	0	75	189
Columbus	0	----	0	92	2	14	0	2	0	21	90
Toledo	0	5	1	33	3	2	0	3	0	14	70
Indiana:											
Anderson	1	----	0	1	1	1	0	0	0	0	7
Fort Wayne	0	----	0	47	1	0	0	1	0	0	26
Indianapolis	3	----	3	141	5	17	0	7	0	2	104
Muncie	0	----	0	9	2	15	0	0	0	0	9
South Bend	0	----	----	8	----	3	0	----	0	0	15
Terre Haute	0	1	1	5	3	0	0	0	0	0	32
Illinois:											
Alton	0	----	0	0	1	0	0	1	0	0	6
Chicago	9	6	2	2,293	36	192	0	46	0	31	745
Elgin	0	----	0	282	1	0	0	0	0	0	8
Moline	0	----	0	7	0	1	0	0	0	5	16
Springfield	0	8	1	3	3	7	0	0	0	4	22
Michigan:											
Detroit	5	7	2	1,174	19	134	0	23	0	149	307
Flint	0	----	1	112	3	2	0	0	0	14	24
Grand Rapids	0	----	0	315	2	4	0	0	0	14	32
Wisconsin:											
Kenosha	0	----	0	76	1	2	0	0	0	1	9
Madison	0	----	0	19	0	2	0	0	0	2	5
Milwaukee	0	7	1	90	8	37	0	0	0	41	116
Racine	0	----	0	6	0	2	0	0	0	0	20
Superior	0	----	0	0	0	1	0	0	0	1	7

[1] Figures for Barre, Tampa, Little Rock, and Salt Lake City estimated; reports not received.

City reports for week ended March 15, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	0	0	1	0	1	0	11	25
Minneapolis	0	------	3	4	2	14	0	2	0	47	112
St. Paul	0	1	1	3	3	5	0	1	0	6	57
Iowa:											
Cedar Rapids	0	------	------	1	------	1	0	------	0	0	------
Davenport	0	------	------	1	------	5	0	------	0	0	------
Des Moines	1	------	------	1	------	9	0	------	0	0	31
Sioux City	0	------	------	0	------	1	0	------	0	2	------
Waterloo	0	------	------	2	------	0	0	------	0	2	------
Missouri:											
Kansas City	1	------	2	19	8	12	3	3	1	34	118
St. Joseph	1	------	0	4	4	1	0	1	0	1	37
St. Louis	1	4	1	141	9	75	0	7	0	33	231
North Dakota:											
Fargo	0	------	0	0	1	1	0	0	0	3	10
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	1	------	------	0	------	0	0	------	0	2	5
South Dakota:											
Aberdeen	0	------	------	0	------	1	0	------	0	6	------
Sioux Falls	0	------	------	0	------	1	0	------	0	0	11
Nebraska:											
Omaha	0	------	0	0	5	6	0	0	1	1	53
Kansas:											
Lawrence	0	2	0	27	0	1	0	0	0	2	9
Topeka	0	------	0	114	1	2	0	0	0	7	16
Wichita	0	------	0	4	2	2	0	0	0	9	26
Delaware:											
Wilmington	0	------	0	166	3	2	0	0	0	0	33
Maryland:											
Baltimore	1	10	3	47	21	23	0	9	1	59	234
Cumberland	0	------	0	0	0	0	0	0	0	4	10
Frederick	0	------	------	0	------	0	0	------	0	0	2
District of Columbia:											
Washington	5	5	1	126	16	32	0	10	0	9	173
Virginia:											
Lynchburg	1	------	0	10	0	0	0	1	0	0	12
Norfolk	0	42	0	73	2	3	0	1	0	7	50
Richmond	0	------	1	41	6	0	0	1	0	0	50
Roanoke	1	------	0	209	1	2	0	0	0	2	27
West Virginia:											
Charleston	0	------	------	39	------	0	0	------	0	0	------
Huntington	1	------	0	7	------	0	0	------	0	0	------
Wheeling	0	------	0	0	1	0	0	0	0	2	24
North Carolina:											
Gastonia	0	1	------	13	------	0	0	------	0	5	------
Raleigh	0	------	1	159	3	0	0	1	0	15	24
Wilmington	0	------	0	9	0	0	0	0	0	6	8
Winston-Salem	0	7	0	5	2	4	0	1	0	9	20
South Carolina:											
Charleston	0	46	0	16	2	0	0	0	8	4	34
Florence	0	------	0	0	3	0	0	0	0	0	9
Greenville	0	------	0	48	0	0	0	0	0	14	6
Georgia:											
Atlanta	0	7	2	22	3	4	0	4	0	2	96
Brunswick	0	------	0	18	1	0	0	1	0	2	4
Savannah	0	27	2	8	1	1	0	5	0	0	34
Florida:											
Miami	0	6	1	9	2	0	0	2	1	6	36
Tampa	------	------	------	------	------	------	------	------	------	------	------
Kentucky:											
Ashland	0	------	0	1	3	0	0	0	0	0	21
Covington	0	------	0	39	0	1	0	0	0	0	12
Lexington	0	------	0	4	0	3	0	0	0	3	18
Tennessee:											
Knoxville	1	------	0	39	0	12	0	0	0	6	18
Memphis	0	3	2	96	2	7	0	7	0	3	87
Nashville	0	------	0	40	5	15	0	2	1	10	63
Alabama:											
Birmingham	1	4	1	86	3	6	0	5	4	13	54
Mobile	0	10	2	7	1	0	0	1	0	0	33
Montgomery	1	2	------	18	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	5	------	1	0	------	0	0	------
Little Rock	------	------	------	------	------	------	------	------	------	------	------

City reports for week ended March 15, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	-----	0	0	1	0	0	1	0	0	4
New Orleans	3	3	1	14	15	3	0	8	1	1	144
Shreveport	0	-----	0	0	1	5	0	2	0	0	31
Oklahoma:											
Oklahoma City	0	-----	0	0	5	8	0	0	1	0	43
Tulsa	0	-----	0	1	1	0	0	1	0	12	22
Texas:											
Dallas	0	2	0	4	4	12	0	4	0	1	64
Fort Worth	0	-----	0	115	1	5	0	2	0	0	29
Galveston	0	-----	0	4	2	0	0	0	0	0	19
Houston	0	-----	2	0	10	1	0	8	1	0	102
San Antonio	1	7	4	0	12	4	0	5	0	5	87
Montana:											
Billings	0	-----	0	0	0	0	0	0	0	0	3
Great Falls	0	-----	1	0	1	0	0	0	0	1	9
Helena	0	-----	0	0	1	0	0	0	0	0	4
Missoula	0	-----	0	0	1	1	0	0	0	0	8
Idaho:											
Boise	0	-----	0	0	2	0	1	0	0	0	12
Colorado:											
Colorado Springs	0	-----	0	0	0	3	0	0	0	4	13
Denver	3	19	1	93	5	7	0	2	0	32	84
Pueblo	0	-----	0	4	1	2	0	0	0	5	3
New Mexico:											
Albuquerque	0	1	0	27	0	0	0	1	0	0	11
Utah:											
Salt Lake City	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Washington:											
Seattle	0	-----	0	3	2	2	0	2	0	11	82
Spokane	0	-----	0	11	1	2	0	0	0	0	31
Tacoma	0	-----	0	0	2	0	0	0	0	5	27
Oregon:											
Portland	0	3	0	15	3	2	0	1	0	0	86
Salem	0	-----	-----	0	-----	0	0	-----	0	0	-----
California:											
Los Angeles	3	27	1	24	6	45	0	20	2	40	394
Sacramento	0	-----	0	4	0	7	0	2	1	10	44
San Francisco	0	136	0	6	9	6	0	13	0	37	205

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Georgia:			
Boston	1	0	0	Atlanta	1	1	0
New York:				Florida:			
New York	3	0	0	Miami	0	0	2
Pennsylvania:				Alabama:			
Pittsburgh	0	1	0	Birmingham	1	0	0
Illinois:				Oklahoma:			
Chicago	2	0	0	Oklahoma City	0	0	1
Iowa:				Texas:			
Des Moines	1	0	0	Houston	0	1	0
Maryland:				Washington:			
Baltimore	1	1	0	Seattle	1	0	0
District of Columbia:				California:			
Washington	1	1	0	Sacramento	0	0	1
Virginia:							
Norfolk	1	0	0				

Encephalitis, epidemic or lethargic.—Cases: Huntington, 1. Deaths: New York 2; Memphis 1.
Pellagra.—Cases: Philadelphia, 2; Charleston, S. C., 2; Savannah, 1.
Typhus fever.—Cases: Savannah, 1; Miami, 1; Mobile, 1; Fort Worth, 1. Deaths: Houston, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 22, 1941.—During the week ended February 22, 1941, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		9	2	17	17	2		5	6	58
Chickenpox		7		152	210	31	33	23	66	522
Diphtheria		23		26		7	1	1	1	59
Dysentery				12						12
Influenza		52			26	4			59	141
Lethargic encephalitis					1			2		3
Measles	4	335	193	283	907	176	382	454	827	3,561
Mumps				193	213	33	27	27	28	521
Pneumonia	2	15			15	2	1	13	14	62
Scarlet fever		24	3	113	178	5	18	28	7	376
Tuberculosis	2	15	11	60	47	1	5	2		143
Typhoid and paratyphoid fever		1		14						15
Whooping cough		2		178	152	2	46	15	16	411

CUBA

Provinces—Notifiable diseases—4 weeks ended February 1, 1941.—During the 4 weeks ended February 1, 1941, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		4	3	12		13	32
Diphtheria	3	27	1	7	1	4	43
Hookworm disease		62					62
Leprosy					1	3	4
Malaria	47	2		17	3	231	300
Measles		1	1	1			3
Scarlet fever		4			1		5
Tuberculosis	10	10	20	39	12	46	137
Typhoid fever	30	59	12	28	15	19	163
Undulant fever		1					1
Whooping cough		5				3	8

[1] Includes the city of Habana.

SWITZERLAND

Notifiable diseases—November 1940.—During the month of November 1940, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	20	Paratyphoid fever	2
Chickenpox	179	Poliomyelitis	28
Diphtheria and croup	99	Scarlet fever	384
German measles	4	Tuberculosis	244
Influenza	36	Typhoid fever	4
Lethargic encephalitis	2	Undulant fever	10
Measles	257	Whooping cough	209
Mumps	76		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of March 28, 1941, pages 674-678. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Typhus Fever

Tunisia.—According to information dated March 13, 1941, a total of 1,500 to 2,000 cases of typhus fever had been reported in Tunisia. The disease was said to be spreading rapidly in the southern part of the country.